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JACOBEAN ENGLAND, 1603-1625 *

SIR GEORGE N. CLARK

My subject is Jacobean England, but I shall not stray into irrelevance if I begin by saying that I have special reasons, as Provost of Oriel College in Oxford, for rejoicing in the opportunity of introducing this subject as part of the celebrations of the three hundred and fiftieth anniversary of the foundation of Jamestown in Virginia. It has for a long time been generally believed, and recently it has been satisfactorily proved, that Oriel was the college of Sir Walter Raleigh, the hero of those earlier adventures which, although they failed, were the indispensible preliminaries to settlement here.[1] Thomas Harriot, the mathematician, was born within a stonesthrow of the College and educated at St. Mary Hall, which adjoined it and was subsidiary to it. He became Raleigh's mathematical tutor and probably had much influence on his thought. He travelled to Virginia with Sir Richard Grenville in 1585 and wrote an account of the products and resources of the country which is a model of accuracy, order and matter-of-fact honesty.[2]

We have indeed no evidence that Jacobean Oriel was linked with the

* Presented at the thirtieth annual meeting of the American Association of the History of Medicine: "Symposium on Colonial Medicine, sponsored jointly with the Medical College of Virginia Foundation, Richmond, Va., May 7, 1957.

[1] For the proof see C. S. Emden, *Oriel Papers* (1948), pp. 8-21.

[2] *A Brief and True Report of the Commodities . . . which are to be found and raised in the countrey of Virginia* (1588, Latin 1590).

successful planting of Virginia in 1607, but there were new connections two generations later. Between 1648 and 1775 about fifty students were sent from schools and colleges in America to Oxford. Sixteen of these were Virginians, and eight of the sixteen, besides one other American, came to this one small college. The first of them, Ralph Wormeley, who matriculated in 1665, was once described by a contemporary as "the greatest man in Virginia." Of the others four belonged to the family of Robinson, which was intermarried with the Wormeleys, and was very much an Oriel family. Christopher Robinson, Ralph Wormeley's predecessor as Secretary of State of Virginia, had a younger brother John, born at Cleasby in Yorkshire, who, beginning in a very humble station in life, entered the College as *pauper puer* and, after being a servitor in his undergraduate days, became a fellow and a notable benefactor of the College, besides being a useful diplomatist, statesman, and bishop of London.[3] These young men must have made the English members of the College aware of many aspects of Virginian life, and perhaps it was not a mere coincidence that, exactly a hundred years after Harriot came here, one of the fellows, the botanist Richard Dyer, gave eight cedars of Virginia which were planted in the grove.[4] The grove has been done away with long ago, but it was still standing when the sixth Lord Fairfax, as an undergraduate, lived with the Provost in the old house, *hospitium praepositi*, which has been my home for the last ten years. He afterwards became a great figure in Virginia. He did something to start George Washington on his career, and, although he was a loyalist, Washington during the War of Independence still thought of him as an old friend.[5]

There are other associations which connect the history of my College with the history of Virginia, but it may appear that however ingeniously historians may trace them in detail they have no bearing on my present theme. They do, however, bring before us one important difference between the world we know and the world as it was when Jamestown was founded. This is the difference of scale. Before the middle of the eighteenth century the comings and goings, the education and marriages, the sayings and doings of a dozen or half a dozen people, even if they were not outstanding or exceptional people, could make an imprint on society which might determine great issues in the future. A small Oxford

[3] Emden, pp. 77-82.

[4] C. G. Richards and C. L. Shadwell, *The Provosts and Fellows of Oriel College* (1922) pp. 116-117. Dyer came to Oriel in 1669 and died in 1730.

[5] Emden, pp. 83-91.

college, with a handful of men living in its walls, was one of the meeting places of minds in which movements of thought were prepared.

Everything in England was still on a very small scale. Only London impressed people as large. Including its suburbs, it seems to have had a population of more than a quarter of a million but much less than half a million. The provinces were thinly peopled. No town of the second rank, such as Norwich, numbered more than about 15,000; the whole of England and Wales, towns and villages and scattered farms, had something approaching five millions. In the city of London and its suburbs, with the neighboring city of Westminster, the principal centres of legislation, administration and justice had for a long time past been concentrated beside the greatest centre of home and foreign trade. This trade was growing and, as it grew, the London merchants strengthened their control over the trade and manufactures of the out-ports and the inland towns. When the charter of the Virginia Company was framed, the mayor and the governor of Plymouth wrote to the principal minister, the earl of Salisbury, protesting against the prospect of being tied by the decisions of a council in London who would be "strangers to us and to our proceedings." [6] Many other provincial merchants had similar grievances; but the tide was running against them, and it is typical of that time that the transatlantic enterprises were hatched no longer in west country manor houses, but in places like the house in Philpot Lane where Sir Thomas Smythe, the head of the Virginia Company and of the East India Company, lived.

As in economic life, so in other matters, London increasingly overshadowed the country. There were other centres of activity and many of them showed resilient energy; but their expansion was coupled with that of London. In the county towns the local dignitaries, from dukes and marquises down to the simple squires, assembled at the regular seasons to do public business, and when there were parliamentary elections the forty-shilling freeholders swarmed about them. The mayors and corporations were local men locally chosen, and there was strong county feeling. Travel was slow and difficult, so regional dialects and customs were slow to change. No one could mistake the atmosphere of York for the atmosphere of Exeter, or even that of Northampton for that of Warwick. But the county towns were also assize-towns, and three times a year they received the learned and awe-inspiring judges, who represented the king in person, with their train of barristers riding in behind them. More than

[6] Historical Manuscripts Commission, Salisbury Papers, xviii (1940), pp. 133-4.

a dozen of the county towns were also cathedral cities. The twenty-six bishops were lords of parliament; they and the deans were royal nominees, and they brought down into the country knowledge and purposes imparted to them by men in high places. The church of England was more centralised than it had been a century before. With the great monasteries a number of homes of learning and influence had disappeared, and now the ecclesiastics no longer corresponded with Rome but, at furthest, with Canterbury, or rather with the archbishop's usual residence at Lambeth.

The university towns of Oxford and Cambridge were the only two strongholds of traditions which could hold out against the metropolis. They were the only two places outside London where printing was allowed; but their presses were watched jealously by the London printers, and it is a somewhat mysterious fact that in 1612 Captain John Smith's *Map of Virginia with a Description of the Countrey* was printed in Oxford.[1] The independent intellectual life of the universities was indeed restricted to narrow fields. They had not, like the continental universities, powerful faculties of law. The Roman law, which they taught, was useful only for practice in the probate of wills and in matters of marriage law and admiralty law. All the teaching of common law and equity was concentrated in the London Inns, and, in spite of the efforts of the king himself, Roman law was losing ground. The Inns of Court not only trained lawyers for practice but gave such education as the country gentlemen needed for their work as landlords, justices of the peace, and handymen in local government. The medical schools of the universities played a distinguished part, but a relatively small part, in training and building-up the profession: London was already its centre. In the two universities a good many sons of well-to-do families acquired a liberal education; a substantial body of clergy were trained and trained well; a few gifted individuals pursued higher studies in the arts and sciences and kept abreast of the newest knowledge; but this is the only great exception to the primacy of the capital.

Dominance and centralisation did not indeed amount to anything like what they have come to mean in the last two hundred years. The government had few salaried full-time servants of any kind at its disposal. It relied mainly on men who owed their offices to wealth and position which they either inherited or gained by their own exertions in business or in the professions, and it rewarded them with status and honours more often than with payments in money. It could not give peremptory orders

[1] See F. Madan, *Oxford Books* (1895) pp. 83-4.

unless it could carry a kind of rudimentary public opinion with it. There was scarcely any police except for elected constables who could only act in their own parishes. There was no army worth mentioning. There was neither the reality nor the appearance of holding the country in subjection by force or by administrative management of the details of daily life. Economic regulations did cover many details of industrial practice; but they were seldom effective unless they fitted the convenience of the craft guilds or the justices of the peace or the borough courts, where the main responsibility lay for enforcing them. The idea of appointing inspectors to see that economic legislation was obeyed was unfamiliar, and it did not suit English ideas of freedom. The only holders of an ancient office of this kind were the aulnagers for cloth (*aulna* being Latin for an ell). They and the surveyors of lead and other trades were amongst the most unpopular and most frequently obstructed of King James' subjects.[8]

English life, then, moved slowly and did not respond easily to any call for action or efficiency. We have to think in the first place of an agricultural country of about ten thousand parishes. Exactly how many social units of any kind there were we cannot say. There were practically no statistics, and no one needed to compile any. We know more about ecclesiastical units. It was reckoned that there were 9,285 parish churches; but this includes the numerous churches in the larger towns.[9] There must have been 9,000 or so in the countryside, and all over the South, the Midlands, East Anglia and the plains and dales of the North, it was normal to find a church with a village and a manor-house near it. It was normal but not invariable. There were many hamlets which had no churches. There were not a few churches standing alone where there had been villages, until the enclosure of common arable fields for sheep-pastures had destroyed the people's livelihood. Sometimes depopulation had recoiled on the owners of the manor-houses and ruined them too: eleven such places were noted soon after this time in Northamptonshire.[10] In the hills of the North, of the West and of Wales there were many little hill-farms not grouped in villages; and, as conditions grew more settled, the number of these was increasing. But everywhere the church and the

[8] For the previous methods and the rise and fall of the inspecting officers under the Stuarts see Sir William Holdsworth, *History of English Law*, vol. 4 (1924) pp. 355-360.

[9] The figure is given in J. Speed, *Theatre of the Empire of Great Britain* (1627) p. 7.

[10] Joseph Bentham, *Christian Conflict* (1635) p. 322. This royalist divine gives the initials of the villages and of the inclosers. T. Fuller, *The Holy State* (1642) p. 101, commenting on the passage, is of the opinion that the inclosers' families had lost their property, or at least their houses.

landowner's house were two buildings whose occupants knew a wider England outside the parish boundaries. Under the system of private patronage which prevailed in the Church of England, the clergyman might have been presented by the squire, or by some great man who was lord of many manors. He might be a mere dependent. He might indeed be an ignorant and even disreputable figure, especially if he was not incumbent of the living, not a rector or vicar, but simply a curate hired to read the services. He was most likely poor in worldly goods, and he may not have received any more respect than he earned by his own character and activities; but he had ecclesiastical superiors who could give him some support, and he was the representative of a religion which no one openly flouted.

Church-attendance was compulsory by law. The Roman Catholics, who were already in a minority, were not actively persecuted. There were savage laws against them on the Statute Book, and after the Gunpowder Plot of 1605 these were made even more severe. King James and his ministers were not consistent, but on the whole it is true that the harsher penal laws were not enforced. At the price of paying fines and suffering hardships which stopped short of physical cruelties, the laity were allowed to profess the old faith. Nor did the king fulfill his threat that he would harry the Puritans out of the land. But in spite of the two kinds of dissent, the bulk of the population went to their parish churches.

The farmers also went to market. There were 643 market-towns. Most of them were so small, and there was so little of the urban in their aspect and pursuits, that we should scarcely regard them as having the characteristics of towns; but they did fulfil the functions of towns, albeit in a humble way. The farmers did not only meet their own kind there; they met dealers and shopkeepers, the men who made their liaison with their ultimate customers and suppliers. The same is true of the industrial workers from the countryside who brought in what they had made on the loom or in the forge. The townsman had his links with the countryman, links of business or social links such as relationship by marriage. And the townsmen had a corporate life in more senses than one. Their churches were often better-endowed than those in the country. They had larger congregations, and sometimes there were wealthy men who, singly or collectively, could increase the endowments. Thus a good many towns had able preaching ministers, men with shelves of books in their houses. Some of them were party men, perhaps Puritans, maintaining principles which they had learnt in Cambridge or London. The grammar schools

had masters, usually clergymen, some of whom were authors and scholars of standing. Here and there was a well-read doctor or lawyer, a travelled business man, or an officer who had served abroad on land or sea. There was no organised literary or intellectual intercourse; but there were little nuclei of intellectual communication. They were nowhere very far apart, and their influence was an important factor in the making of the English mind. Unhappily we know far too little about them. Apart from church-affairs and the biographies of a few outstanding individuals, historians have paid little attention to them. Their records have inevitably not been so well preserved as those of the country landowners, whose manor-houses stood for centuries and had ample room for estate-muniments, for inventories, for account-books, and for the correspondence not only of those who lived there but of their relations and friends as well. But if we may guess at the answer to a simple question which has not been investigated yet, I suspect it will add a valuable fact to what we know about these towns. It is the question where were all the many books that had been printed in England, and the not inconsiderable number that had been imported. The largest collections, of course, were in the university and college libraries in Oxford and Cambridge, in the Inns of Court, in some of the cathedral libraries, and in the private studies of some ecclesiastics, and a few statesmen. Few of the country gentry had acquired many of them yet, few even of the nobility. The lesser clergy had among them men with a good many books and men with none at all. But the total resources of a town must often have been enough to make it a notable magazine of knowledge.

A country with this kind and only this degree of articulation was not good material for central planning. Whatever might be the purposes of the ministers, of the law-officers who drafted charters and even of Sir Thomas Smythe and his companies, the great achievements depended on spontaneous and unconscious growth. Although we cannot trace it statistically, and we know little of it in detail, we do know that many kinds of growth which were stirring were all upheld by the fundamental underlying growth of population. These years were the first in which great numbers of Englishmen of all classes set out for new homes overseas. A recent writer on Elizabethan history has emphasised the continuity between the Irish wars and the first Virginian voyages. He has shown, name by name, how many there were who, like Raleigh himself, fought and farmed in Ireland before they set out for America.[11] These, how-

[11] A. L. Rowse, in *The Expansion of Elizabethan England* (1955) and in his Raleigh Lecture on Sir Richard Grenville, still awaiting publication.

ever, were the forerunners, and before the main body came, there was a change in England which made them ready to go. Population had grown so that the farms and towns could not make room for it. There was a revival of home colonisation, in which little had been done for generations. Some of the draining of flooded lands was emergency repair-work, for instance in the Thames estuary and in East Anglia; but from the Fen country in the east to Sedgemoor in the west there were schemes, in some of which the king himself invested, for winning new agricultural land. Numbers of Englishmen and greater numbers of Scotsmen went to Ireland, whither the crown promoted emigration partly by compelling the City of London to assist. This was the accompaniment to the great new theme of emigration to America. Individuals had their personal reasons for going, and the romance of the movement lay in their personal stories; but the great impersonal growth of numbers set them free to go. And other conditions then prevailing around them opened the way for them, one condition above all others.

This England was at peace at home and abroad. The long reign of Queen Elizabeth I had been full of excitements and disturbances, but at the end of it her ministers had begun to negotiate for a peace-settlement. The war had passed its crisis when the Spanish Armada was defeated fifteen years before. Few or none remained among them who believed that the common interest of resistance to Spanish domination overrode every separate English interest. Now they had a new sovereign who was already king of Scotland and Scotland was not at war with Spain. According to the international law of the time war was between sovereign and sovereign, and James could therefore issue a proclamation to stop all acts of hostility at sea. It was reciprocated from the other side. Negotiations for a settlement of the issues of the war were soon begun and easily completed. The Dutch, who had been our allies for many years by treaty and informally for a good many more, were displeased but not so seriously as to be aggrieved.

The settlement was not unpopular in England. With a single exception, the great and tragic exception of Raleigh, it did not bring about the fall of any eminent public man, and Raleigh, whose fall was due to other contributory causes as well as to this, was rather a royal favourite and a powerful influence than a statesman in high ministerial office. Raleigh was convicted of plotting to oust the king. His prosecutors were brutal; but his judges honestly believed him guilty. His crime was capital, but the immediate penalty was only a long confinement in the Tower of London.

It was only later that the imprisoned hero became the symbol of suppressed and frustrated national ambitions.

For at least the first ten years of James's reign the peace spelt opportunity. It brought quiet at home as well as abroad. There were indeed, in the very year of the foundation of Jamestown, agrarian disturbances in the Midland counties; but they were easily suppressed; they did not lead to rebellion or to encounters between opposing armies; and, although the names of Levellers and Diggers were heard, they did not seem ominous then as they do to historians who know about the revolutionary Levellers and Diggers of half a century later.[13]

King James not only presided over the making of the peace; he maintained it throughout his reign. When he died it was breaking up, but it was still not broken. It lasted for twenty-one years, the longest period of peace with all her neighbours that England had ever enjoyed, longer than any she was to enjoy again until after the fall of Napoleon. On official occasions, for instance, in a speech of Bacon's, delivered by him as lord chancellor at the opening of parliament,[14] the Jacobean peace was acclaimed as a golden age, and with at least this much reason that it had made two things possible which had never been achieved by the exertions of the Elizabethan age. It set free the capital and the man-power which, with whatever disregard of humanity and whatever narrowness of imagination, did at least give Ireland a respite from bloodshed for a generation. It enabled the settlement of Virginia to strike root. No doubt there were other conditions which distinguished the earlier and unsuccessful attempts from that which succeeded. The lessons of the earlier failures were learnt. The quest for gold gave place to the cultivation of tobacco and the exportation of timber. Ambitions were sobered, and organisation was strengthened; but the records of the Virginia Company show that the adventurers still felt their successes were precarious. One of the reasons for this was the risk, never wholly exorcised, of a new resort to war.

The Jacobean period, then, was not merely a lull between the Spanish war and the civil war, a lull during which grave internal divisions of England were brewing and would soon cause armed collision. It was a period during which peace, attained and maintained by policy, was used as the opportunity for reconstruction at home, and for expansion over-

[13] See E. F. Gay, "The Midland Revolt and the Inquisitions of Depopulation of 1607" in *Transactions of the Royal Historical Society*, New Ser., 1904, *18:* p. 195.

[14] *Letters*, ed. J. Spedding, vol. 7 (1874) p. 175.

seas. Many historians have stigmatised this peace as inglorious, even ignoble. They have blamed King James for refusing to support his son-in-law, the Elector Palatine, in his war against the emperor. This was advocated as a protestant crusade and it was also a struggle first to enlarge and then to recover the elector's own personal dominions. Any historian who is attracted by this line of thought would do well to remember that Queen Elizabeth never engaged in a protestant crusade; that she did not make open war against Spain until she was attacked; that she had more powerful allies than were available to James and finally, that the Elector Palatine began his disastrous adventure without waiting for James's advice which, when it arrived, was flatly against embarking upon it. Apart from the German question James has been censured for pursuing a policy of appeasement in regard to Spain. Whether or no the dexterous ambassador Gondomar outmanoeuvered him is not to the point. It may be conceded that James lacked personal dignity, and that he seldom or never displayed physical courage except in the hunting field. He did attempt to use friendship with Spain, and even a Spanish marriage-project, as levers for his political ends, and for supporting the claims of the elector himself. That was not appeasement in the sense in which it has become a term of abuse. It included no sacrifice whatever of tangible national interests. All it offered to Spain was continued peace. As soon as it became clear that the Spaniards wanted much more than that, James reluctantly gave way to the militant enthusiasm of which his favourite Buckingham became the champion. It is strange that he should be condemned by many historians who believe, as he did, that armed crusading does not promote the cause of true religion, and that dynastic interests should be subordinated to greater considerations of policy.

These considerations of common sense would have been more familiar to us if it had not been for one black stain on James's memory, the execution of Sir Walter Raleigh. He could have prevented it, and if he had prevented it, he might well have been rewarded with something like gratitude and something like popularity. But Raleigh had attacked the Spaniards in breach of his promise; he had obtained a commission from the admiral of France; he had not only risked but attempted a *fait accompli* which might have blown the peace sky-high. Only success could have made sense of all this, and Raleigh had failed. It was foolish and worse than foolish of James and his ministers to set Raleigh free for his venture; it was mean and cruel to make him alone pay the penalty. Sometimes it is mean and cruel to conform to the promptings of common sense.

The praises of James as *rex pacificus* were nowhere expressed so eloquently, or at any rate with such a copious flow of words, as in the universities. They genuinely appreciated him also as the most learned sovereign of his time, and if his learning led him to interfere with them when he suspected negligence or unorthodoxy, they gained substantially from his favour. After the purges and conflicts of the sixteenth century they had begun to recover in Queen Elizabeth's later years. Sir Thomas Bodley's first steps towards the foundation of the Bodleian Library may serve as a landmark, and it was actually opened before the queen died; but his new building and the fruition of his plans belong mainly to the years of peace. In Oxford two new colleges were founded; five of the existing colleges added to their buildings and at least one other planned a complete rebuilding. Four new professorial chairs were endowed, one for natural philosophy, one for geometry and astronomy, the third for moral philosophy and the fourth for ancient history. In Cambridge there were not new chairs and new colleges; but there was revived activity. It was at this time that Thomas Nevile, master of Trinity, "a man with unusual imagination, authority, and strength of will" [14] re-arranged and extended the buildings of his college, leaving it with the two courts which, for many Englishmen and not a few Americans, are the best-beloved academic buildings in the world. These and the other buildings were the homes and the expression of a creative revival in thought and teaching.

Then, as now and always, the universities were not merely local or merely national; they drew their nourishment from all over the world. It is worth while to ask whether the peace made intercourse with the thought and learning of other countries easier and more active. That it had some such effect in other departments of life can scarcely be doubted. Although she was a good linguist and well-versed in foreign affairs, Queen Elizabeth I was the least European of English rulers. All her grandparents were English, and she never went abroad in her life. She was the only English sovereign since the Norman Conquest who never ruled over an inch of territory outside the British Isles and the Channel Islands. King James was not an Englishman at all; he was born a Scot, which then meant a foreigner. His mother was half French and his hereditary right to the English throne was derived from one English great-grandmother. He only crossed the sea once, but, at the time of his marriage, he did spend a winter in Denmark. Some of the leading figures in the civilisation of our country in his time were formed partly by their

[14] G. M. Trevelyan, *Trinity College, an Historical Sketch* (1943) p. 21.

travels or residence abroad. Such were the patrons of learning, Sir Thomas Bodley, Sir Henry Savile; the poet and scholar Sir Henry Wotton, and the architect Inigo Jones. May we take them as representatives of a greater accessibility to influences from abroad?

This question appears simple, but it is extremely difficult. In the first place there is the difficulty of scale which I have already mentioned. In the two periods which we have to compare the number of Englishmen travelling abroad and making ready to bring back significant new contributions to thought or learning or the imaginative arts never at any one time exceeded a few score. I think we may say it never reached as much as a hundred. We are dealing with an age of sparse populations and of small, widely scattered centres of enlightenment, in which, paradoxically enough, remoteness mattered comparatively little because, to attain any passable standard, it was necessary to travel to the few places, however distant, where such standards were understood. Thus Elizabethan England, in spite of its isolation, drew upon the intellectual and artistic resources of all Europe. There is no need to mention the Italian poets and story-tellers who inspired Sir Philip Sidney and Spenser and Shakespeare; or the influence of Montaigne on ideas and on literary habits; or the Englishmen who learnt in Padua. One who did so was William Gilbert, the writer on the magnet, the greatest of the Elizabethan scientists. Without disparaging his predecessors, we may call him the pioneer of the scientific revolution of the seventeenth century. In these matters of frequenting foreign universities and responding to foreign influences it is always misleading to divide history into sharply contrasted periods; the processes are slow and their results enduring; each generation matures before the last is superseded; and so Elizabethan England melts into the England of James I. They have one thing in common which shows that even the intellectual maturity of that time was still only the kind of maturity which belongs to a relatively simple society. It is an intelligible, if at first sight surprising, rule in economics that the proportion of foreign trade to home trade is apt to be much higher in an underdeveloped society than in a fully developed economy. In the same way the proportionate intellectual influence of foreign countries was greater in the Middle Ages and right down to the late seventeenth century than in the later period when the country had acquired greater resources of its own.

These are all reasons against ascribing great importance to the Jacobean peace in the regions of the mind; but when their due weight has been allowed for, there are still significant arguments on the other side. Eng-

lishmen frequented the foreign universities at least as much as they did in Queen Elizabeth's time, and probably more. The Dutch universities were nearer at hand then those of Italy; they were more congenial to the majority of Englishmen because they were protestant; men and ideas converged in them from at least all protestant Europe. The first of them, Leyden, was only founded in 1574; but a steady stream of English students went over and matriculated, even if they did not study there. There was no notable increase in the reign of James; and there were no very eminent men among them, but the effect was cumulative. In the last complete year of James's reign there were fifteen; in the whole reign 120. Letters and "philosophy" attracted the most; in the higher faculties theology was the most popular.[15] We must remember the difference in scale which I have already mentioned, and if we do so we shall not underrate the importance of these figures. In the matter of theology the established churches of the English and the Dutch were both much divided internally, and there is no doubt at all that the two inharmonious parties, the Calvinist party and the party opposed to it, both drew encouragement and instruction in each country from sympathisers in the other. One of the major changes in the Church of England in the reign of King James was the introduction of Arminian ideas, a system of ideas opposed to the Calvinism of the Puritans. Arminius, after whom it is named, was a professor at Leyden. It was not only, perhaps not mainly, by means of university students that his ideas crossed the North Sea; but they provided part of the intellectual ferry-service. It was the same with some of the refinements of Calvinistic thought. Although, as I have said, there were no eminent men among these students, there was more than one man whose name is well known to history. John Bastwick, later the Puritan victim of a brutal punishment by the Star Chamber in the reign of Charles I, was a student at Leyden.

There were two other Dutch universities besides Leyden, and, although they were smaller and less famous, they played their part.[16] At Leyden the records of matriculation are incomplete, and from other sources we have names of some who took degrees without matriculating, though possibly also in some cases without any period of study.[17] The most

[15] The figures from the *Album studiosorum Academiae Lugduno Batavae* (1875) are analysed in G. N. Clark and W. J. M. van Eysinga, *The Colonial Conferences between England and the Netherlands in 1613 and 1615*, vol. 2 (1951) pp. 10-11.

[16] The *Album studiosorum* of Franeker (founded 1585) has not been published; but that of Groningen (founded 1614) records two English medical students in 1617.

[17] H. T. Colenbrander, "De herkomst der studenten" in *Pallas Leidensis* (1925) gives doctorates granted to Englishmen in 1603-25. I owe this information to Dr. A. van Marle.

interesting part of this additional information relates to medical students. To be sure there are no great names in English medical history in this short period. It seems an uneventful interval between Dr. Caius and William Harvey. But Harvey published his great discovery only three years after the death of King James, and he is believed to have made it as early as 1613. The steady laying of foundations was carried on, and, among others, by some twenty-four medical students who went to Leyden from 1578 to 1602, followed by another thirty-four or so from 1603 to 1625. The very first medical student of any nation inscribed at Leyden was an Englishman, John James. A number of others achieved high professional success, and one or two were prominent in the teaching of medicine in England. One who deserves to be remembered to-day is Laurence Bohun, the first Leyden graduate to practise medicine in America. In 1602 he became the first physician general of Virginia. He was killed in a sea-fight with the Spaniards.[18]

These students came from Great Britain, to use the name given to the island on the accession of King James VI of Scotland to the English throne. So far I have said scarcely anything about Scotland except that the king came southward from there. My subject is Jacobean England, (or rather England and Wales, South Britain, as the geographers sometimes say), and for a reason. James ruled over both kingdoms; and this made a momentous change in their international relations; but there was no constitutional union and no economic union. The king looked forward to these things, but he could not overcome the suspicious conservatism of his new subjects. The English parliament rejected his proposals for a full union, and statesmen had to work for it through a whole century of mistrust and conflict while the two nations tried to live their separate lives. They did not act together, generally speaking, in commerce, and therefore it was England and not Great Britain that founded Virginia. But it would be ungrateful not to mention the Scottish medical students, if only because it was a Scottish medical historian who discovered not only these Scottish names but the English medical students in Leyden as well. In a later century Scotsmen returning from Leyden played a great part in British medical progress, and even at this time there was closer intercourse between Scotland and England in intellectual matters than in other matters. They had, of course, a common language, or rather they almost had; for the vocabulary and spelling of Edinburgh

[18] R. W. Innes-Smith, *English Speaking Students of Medicine at the University of Leiden* (1932), an alphabetical catalogue with valuable references.

(to say nothing of Aberdeen or the Gaelic-speaking Highlands) were as much unlike those of London as pronunciation; Scots was not a dialect but a language, with its own standards for writing and printing, and remained so until the middle of the seventeenth century. They were, however, mutually intelligible, and they did not depend on their mother-tongue in academic matters. John Napier published his great invention of logarithms at Edinburgh in 1614, and he published it in Latin.[19] It was immediately taken up by the two leading English mathematicians, both of them Cambridge men: Edward Wright translated the book, and Henry Briggs not only suggested some improvements to Napier, but deserves much of the credit for the rapidity with which logarithms came into general use. I ought, however, to confess that academic England was by no means completely cosmopolitan in its outlook. Some years after King James arrived in England, he ventured to enquire about the possibility of finding places at Oxford and Cambridge for students from Scotland. The heads of the colleges replied that their statutes made it impossible.[20] Most likely this was true, and no doubt they believed that the statutes bound them irrevocably; but it is hard to believe that there was not some narrow conservatism there.

Logarithms were among the necessary tools of the great scientific movement which was gathering momentum in this period. On the continent it was the period of Kepler and Galileo; in England, as we have seen, it was a period of busy, quiet preparation, and this preparation had its great advocate in a man three years older than Kepler and ten years older than Galileo, Francis Bacon. Bacon was still revered as a master when English science began its golden age in the early days of the Royal Society under King Charles II, and in his own time his fame was not merely local but European. His was a towering and many-sided genius. He was a great statesman and jurist, and a wonderful writer of prose, and he had a wide grasp of all the varied intellectual activities of the time. It was partly because of his close association with King James and of the atmosphere of his time that the great work of his maturity took its final form as an ambitious programme for science. In the symbolic frontispiece of his greatest book the advancement of learning is represented by a ship setting out on a voyage of discovery. Like this frontispiece the whole book bears the characteristics of its period; but Bacon failed to see where the

[19] *Mirifici logarithmorum canonis descriptio, seu arithmeticarum supputationum mirabilis abbreviatio.*

[20] *Calendar of State Papers, Domestic, 1603-10* (1857) pp. 569, 571.

great discoveries of the next generation would be made, or by what methods. He was an amateur, and he neither was a mathematician nor understood that quantitative thinking was the vital need of the time. Not only Kepler and Galileo but Harvey used it. Harvey was seventeen years younger than Bacon and Bacon died in the year when Harvey published his *De motu cordis*. A still younger man, who knew Harvey towards the end of his life, has recorded two of his remarks about Bacon, whose physician he had been, both, unfortunately, hard to interpret. The first seems to me merely an observation in natural history. Harvey said that Bacon's delicate, lively, hazel eye was "like the eye of a viper." The other goes to the heart of Bacon's deficiencies. Harvey esteemed him much for his "witt and style," but would not allow him to be a great philosopher. "'He writes philosophy like a Lord Chancelor,' said he . . . speaking in derision; 'I have cured him.'" [21]

I wish we could say that Jacobean England made an impression on continental thought; but that would be an exaggeration. Even with our scale of measurement in mind, we cannot draw such an inference from the circulation of English books on the continent. During the Elizabethan age, so far as we can tell, very few English books had found their way even to foreign universities. Now England produced more of the books which could interest scholars, chiefly Latin books of science, learning, or religious controversy. Thus we find that, whereas no English books were available in the German book-fairs in 1564-69, and only negligible quantities of them in the succeeding thirty years, in 1610-19 there were 151 English titles among a total of 2,685 from all sources. After that the Thirty Years War choked even this little channel.[22] During the last and greatest years of Shakespeare, England still received far more than she gave in learning and literature.

From all the evidence I believe our most valuable conclusion will be that, in spite of every manifestation of national sentiment or national idiosyncracy, in spite of the insularity of its language and its institutions, England was a part of Europe. We have seen that it was so in the world of thought, and this world of thought included the geographers, the mathematicians who studied navigation, and the students of American languages and of customs and of American materia medica. Elizabethan and Jacobean Englishmen bought and translated Spanish books about these matters: there was a common European stock of knowledge derived from

[21] J. Aubrey, *Brief Lives*, ed. A. Clark, vol 1, (1898) p. 72 ff.
[22] J. Goldfriedrich, *Geschichte des deutschen Buchhandels* (1908) p. 76 ff.

overseas expansion and reinvested in it. There were common European elements in the motives of the individual Englishmen who crossed the sea: French Huguenots had sought a refuge from persecution in America long before English Puritans found one. There was a European system of diplomacy. In spite of its primitive inefficiency and its chronic inability to bring the states together in creative co-operation, it did from time to time provide a respite from war. More than that, it did enable the states to agree on some elementary principles of international justice. Jacobean England did obtain in practice the acquiescence of Spain, which had never been granted before, in the presence of other Europeans on the American mainland. That was an immense step forward not only for England, but for Europe, and ultimately not only for Europe but for the world. I claim that it is historically appropriate for this tremendous fact to be symbolised in the simple syllables of the name " Jamestown."

THE SEVENTEENTH CENTURY ENGLISH MEDICAL BACKGROUND*

J. J. KEEVIL

In thanking you most sincerely for inviting me to address you on this historic occasion, it is also my pleasant duty to acknowledge the very generous action of the Medical College of Virginia Foundation in making provision for my visit and to refer to my indebtedness to the Wellcome Trustees. Some of the material for this lecture has been collected while carrying out research for the trust founded by Sir Henry Wellcome, that son of a Wisconsin farmer to whose vision and munificence the study of medical history owes so much.

My purpose is to recreate something of the conditions in England during the century which saw the firm establishment of Virginia, a century during which more than a hundred thousand immigrants landed on these shores, and I shall begin with the venture of just such a traveller.

If one of our ancestors had attended a meeting of the corporation of Norwich on Saturday, the 16th July, 1670, he would have dealt, among other business, with one of the routine requests which came before the mayor and aldermen for permission to set up a notice in public places in the city. The applicant was a young surgeon of Great Yarmouth, called Thomas Smiter, who, in his own words, wished "to give notice that if any person will voluntarily contract with him to be transported to Virginia, they doe repaire to the house of Geo Thirkette at the syne of the Shipp in Conisford."[1] License was granted, and a few days later the roughly printed bills were nailed by Smiter to posts in the market square and outside the cathedral and many inns of the city.

We do not know who read the bills and went to Conisford to join the party being organized by the surgeon, but there were many who had heard of the Scrooby congregation whose first attempt to sail to America had ended in prison in near-by Boston; this party had, however, been under religious leadership and had left England for the sake of conscience.

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[1] C. Williams, *The Barber-Surgeons of Norwich* (Jarrold, Norwich, 1896), pp. 27-28.

What were the circumstances which could lead a young surgeon to embark on a colonial adventure at a time of religious toleration, when England was enjoying the interval of five years peace between the second and third Dutch wars, when the great plague that had entered England from a Rotterdam ship calling at Great Yarmouth was a four year old memory, and when a successful surgeon could look forward in a country town to building up a practice of some 450 patients among whom no more than a dozen might die in a year?[1]

Many factors may have influenced a country surgeon to come to Virginia in 1670: he may have been drawn by family ties or the prospect of an inheritance, he may have been impelled by the difficulty of making a livelihood in the relatively poor farming community of East Anglia and of facing the growing competition of other general practitioners; he may have been pressed into the navy for the second Dutch war and served in the many east coast battles between 1665 and 1667, and have seen the next war coming. We shall never know what brought Thomas Smiter and other surgeons to Virginia during the seventeenth century, and the reason for this is that they were ordinary, law-abiding, representative citizens whose lives are not recorded. Had Smiter been a Fellow of the Royal College of Physicians, the position would have been very different for we are familiar with the lives of members of that small, exclusive, and privileged body, but although some Fellows benefited from the wealth of Virginia, in their case the traffic was in the opposite direction.

My intention is therefore to describe not the background of the eminent men who did not cross the water, but of that lesser known medical community trained in country guilds, licensed by the bishops of their dioceses, the greater number of whom were drawn from yeoman or merchant families living in small country towns, and whose knowledge was derived primarily from the masters whom they had served as apprentices for seven years, a knowledge supplemented by rare lectures and anatomical demonstrations the extent of which depended upon the guild to which the apprentice had been admitted and of which he received the freedom after completing a final year as a journeyman or assistant.

Since the history of the medical guilds has largely escaped attention I shall give some time to it. We have to go back to 1363 for the first important stage in their evolution, when an act[2] was passed requiring every man practising a trade to belong to a guild. Barber-Surgeons guilds

[1] J. Yonge, *Journall*, MS., Plymouth Institution, Devonshire, 1703.

[2] 37 Edward III (1363), c. vi, *Statutes of the Realm*, 11 vols. in 12 (London, 1810), vol. 1, pp. 379-80.

had of course existed long before this: In London[4] probably since 1180, in Exeter in 1308, in Norwich before 1388, in Lincoln before 1369; in Bristol[5] one was well established by 1395; barber-surgeons and physicians united in a fellowship at York where the standard of teaching was high and the licensing rules rigidly observed; at Newcastle the barber-surgeons combined in 1442 with the wax-chandlers whose wax they used in embalming; there was a guild at Salisbury which, in 1614, was granted the body of an executed criminal for dissection; there were surgical guilds at Beverley, Chester, Durham, Gloucester, Hereford, Hull, Ipswich, Oxford, Reading, St. Albans, Southampton, Worcester, Edinburgh, Aberdeen, and Glasgow, Dublin, Cork, and Limerick. There were probably a number of others whose records have disappeared.

In England these guilds modelled their rule on that of the London company and they may have been more closely linked with it than we realize; I think we must conclude this from such evidence as that provided by the arms of the Bristol company which were identical with those of the London one. Another piece of evidence is the order[6] made by King James I, when granting a new charter to the London company, that all naval surgeons irrespective of their guild must become foreign brothers of the London Barber-Surgeons' guild.

Thus, at the beginning of the seventeenth century, we have a system of medical education in England, following a roughly uniform pattern through its central association, but more widely dispersed over the whole country than are all the medical schools of today. Only in one very important issue did the provincial guilds differ from the London one in that they could include physicians and apothecaries, as in the case of Bristol, while the Norwich guild, in 1561, styled itself the Company of Physicians and Barber-Surgeons,[7] and later included apothecaries. In so far as the very term general practitioner comprehends every branch of the medical profession, we can truly regard these English provincial guilds as the early nurseries of general practice.

In London the position was very different for there the profession was a house divided against itself. Under the Plantagenets there were three professional bodies: an undefined group of physicians, the small Fellowship of Surgeons, and the ancient Company of Barber-Surgeons.

[4] S. Young, *A Short Account of Richard le Barbour, Master in 1308*, tract, privately printed, 1908, p. 8.
[5] F. B. Bickley, *The Little Red Book of Bristol*, 2 vols. (Bristol, 1900), vol. 2, p. 69.
[6] S. Young, *The Annals of the Barber-Surgeons of London* (London, 1890), p. 114.
[7] Williams, *op. cit.*, p. 6.

The apothecaries did not form a distinct group, being incorporated with the pepperers and spicers, and then with the grocers' guild. In 1421, four years after the battle of Agincourt, King Henry V approved regulations for qualifying examinations for physicians and surgeons and, possibly with a view to giving effect to these, a college of physic and surgery was established[8] in London in 1423. But it only survived for one year. The next step was taken by Henry VIII who, accepting the division in the profession, incorporated the College of Physicians in 1518, and united the Fellowship of Surgeons with the Company of Barber-Surgeons in 1540. For more than two centuries the College and Company were to be irreconcilable, membership of one involving exclusion from the other except on rare occasions when royal intervention overruled this division. The Barber-Surgeons Company, however, could and did employ physicians to give lectures; its members never admitted the right of the College to prohibit their giving internal medicines and, seven miles outside the city where they were beyond the College's jurisdiction, surgeons freely practised physic as well as surgery.

A further element of conflict appeared in London when, in 1617, King James I granted a charter to the Society of Apothecaries in recognition of the advances in therapeutics and the development of chemistry. Reluctant at first to emerge from the shelter afforded by the powerful guild of grocers, the Apothecaries quickly established their corporate life and, in 1623, opened their first laboratory. They set a high standard for their apprentices who could not be accepted without a knowledge of Latin and who had to observe strict rules of conduct. For those who did not live with their masters, there was a dormitory at the Hall over the Master's lodging and bolted to this day from the outside. These students saw medicines compounded both for physicians and surgeons and, accompanying their masters on their rounds, gained a wider practical experience of therapy than could either a physician or a surgeon. In London the apothecaries were soon accepted as the general practitioners, and slowly displaced the numerous quacks who had flourished since 1542 when Henry VIII allowed by his so-called quacks' charter a measure of unlicensed practice.

The apothecaries were already centered round Bucklersbury near St. Paul's cathedral when Shakespeare wrote *The Merry Wives of Windsor*: there they had their "shops whose scent in simple-time lay heavy on the air,"[9] and there they were to be found during the great plague of 1665

[8] Guildhall Library, London, *Letter Book K*, ff. 6b-7b, 9b, May 15, 1423.
[9] Merry Wives of Windsor iii, 3, 79, Globe edition.

when the leading members of the profession fled the city with their patrons. Economic reasons influenced them in remaining but their action was long held in grateful remembrance and it added to the Society's influence.

Where these humbler men paved the way, others followed, and both leading physicians and surgeons slowly emerged from the seclusion of great houses, where they had been the personal attendants of noblemen, into the publicity of general consulting practice. It is significant that in the case of the two Baldwin Hameys, of whom I have written, this change should be so clearly accepted within two generations. Whereas the elder Hamey in 1601 regarded his failure to get an appointment in the Earl of Essex's household as a major setback, his son in 1655 preferred his own London practice to accepting an invitation from the Earl of Northumberland to come and look after him at Petworth House in Sussex. Neither the elder nor the younger Baldwin Hamey was, however, representative of the profession as a whole, the one a Licentiate the other a Fellow of the College of Physicians, both university graduates and both Londoners with that contempt for the provinces which created such strong reaction during the civil war.

To members of the College the increasing competition from men with lesser qualifications was evidence of a lowering of the status of the profession. It was this which led Thomas Wharton, the anatomist and physician, to advise a young man not to enter it and made him write[10] in 1673 of "the swarmes of quackes, mountebacks, chymists, Apothecares" who were tending "to overthrow all our old settled and approved practice of physick especially in London." Wharton was old and embittered, however, and he had little more justification for including apothecaries in his attack than for mentioning "this new upturned brood of Vertuosis," the Royal Society, yet he castigated them all. Had he been challenged, he would have had to admit that the surgical position had changed since Thomas Gale declared, in 1563, that "Few . . . that have wel brough up there sonne will put hym to the arte, because it is accounted so beggerly and vile."[11]

Surgery in the sixteenth century had certainly been rudimentary. As late as 1589, during an expedition known as the Portugal voyage under the leadership of Sir Francis Drake, a colonel remarked:[12] "our English

[10] Royal College of Physicians, London, Thomas Wharton's MS. *Letter Book*.

[11] T. Gale, *An institution of a chirurgian contcyning the sure Groundes and Principles of Chirurgiry moste necessary and mete for all those that will attayne the arte perfectly* (London, 1563), fol. 10^{v}.

[12] R. Hakluyt, *The Principal Navigations, Voyages, Traffiques & Discoveries of the*

surgeons (for the most part) be unexperienced in hurts that come by shot; because England hath not known wars but of late," and he might have added the comment that the Armada battle in the preceding year had only produced a few casualties in one or two ships. This situation continued during the pacific reign of King James I, but by the close of the seventeenth century the whole position had changed. Not only had King Charles I declared war on Spain and France, but twelve years after peace was signed, the civil war began. All over the country there was fighting. The last battle was fought at Worcester in 1651, but the first Dutch war began next year and this was followed by war with Spain. Throughout Cromwell's rule there was fighting and it began again with the Restoration: the second Dutch war was succeeded by the third: the almost bloodless revolution of 1688 only led to William III's war with France, ending in 1697. Few surgeons can have escaped impressment at some time in their lives during this three-quarters of a century of fighting which left so deep an imprint on contemporary surgical literature, and many of those who came to Virginia may have done so in the hope of more tranquil conditions for themselves and their families.

I have referred only to surgeons, but after the middle of the century apothecaries were also drawn into the armed forces. Physicians, with the exception of a number so small that we know them all by name, were not regularly appointed to the fighting services until the very end of the seventeenth century. Their absence goes far to show that surgeons were accepted as general practitioners. William Clowes certainly held the view that they must be free to administer medicines, so did John Woodall, surgeon general of the East India Company and Master of the Barber-Surgeons of London. James Cooke who described himself as "Practitioner in Physick and Chirurgery" at Warwick wrote books covering the whole field of medicine: addressed "to the young surgeon" they became the text books of the day. Cooke's experience was gained in the civil war; that of Richard Wiseman, a royalist in exile, was gained in the Spanish navy: when he returned to become serjeant surgeon to King Charles II, he contributed two of the most popular text books of the century: *A Treatise of Wounds* (1672) and *Several Chirurgicall Treatises* (1676): he illustrated his teaching from the records of 600 cases chiefly of men wounded at sea. In 1679 James Yonge published his account of the flap method of amputating. This appeared in the *Currus Triumphalis é Terebinthô*, dedicated to John Knight, surgeon general of the army, and

English Nation. Hakluyt Soc., Extra series, 12 vols. (Glasgow, 1903-6), vol. 6, pp. 480-481.

containing two letters addressed to James Pearse, surgeon general of the navy, and Thomas Hobbs, the future serjeant surgeon. Yonge himself had been a surgeon's mate in the navy at the age of eleven, and always acknowledged that his great skill in surgery came wholly from his experience while serving under naval surgeons. The credit for devising the flap method he gave, however, to a practitioner of Exeter, the city in which Yonge had received from the bishop his license to practise.

Yonge's education is of some interest because it shows how men could obtain a qualification without ever attending a lecture and solely by apprenticeship. He acquired his whole great knowledge of anatomy from post-mortem examinations, a practice widely adopted since the early years of the century. As an example, I would quote the case[13] of Robert Wright, a London practitioner born about 1600 and a sometime apprentice of Dr. Robert Fludd, the Rosicrucian philosopher, and later a graduate of Leiden and Cambridge. According to a contemporary, Wright "on the death of his patients, lest he should be criticized . . . took sufficient care straightway to open the body and demonstrate to the onlookers the inevitability of death." Wright lectured on anatomy at Surgeons' Hall, teaching in a theatre designed by Inigo Jones in 1636. After the Reverend John Ward visited this theatre in 1661 he noted in his diary[14] that "in the theatre there are skeletons, and one statue there is resembling the muscles. One skeleton there is over the table, to let down for inspection in time of dissection. Dr. Scarborough had a wooden man, wherein the muscles, with all their motions, were represented." The reference is of course to Sir Charles Scarburgh, whose parents emigrated to Virginia where his brother, Edmund, became a member of your House of Burgesses and a justice for the county of Northampton.[15] Possibly the so-called wooden man, to which Ward refers, was the one constructed by Sir Christopher Wren who is reported[16] to have "explained by Models formed of Pasteboards, the Anatomical Administration of all the Muscles of an human Body, as they naturally rise in Dissection, etc., for the Use of Dr. Scarborough's celebrated lectures." From the time of John Caius, distinguished men had taught anatomy at Surgeons' Hall, and at the end of the century we find James Yonge coming from Plymouth to attend the lectures of Edward Tyson, the comparative anatomist.

[13] J. J. Keevil, "The Training and Practice of a London Pathologist, 1637-46," *Brit. Med. J.*, 1951, *2*: 231.

[14] *Diary of J. Ward, 1648-79*, ed. G. Severn (London, 1839), p. 9.

[15] J. J. Keevil, "Sir Charles Scarburgh," *Annals of Science*, 1952, *8*: 113-121; p. 113.

[16] C. and S. Wren, *Parentalia or Memoirs of the Family of the Wrens* (London, 1750), p. 187.

At the nearby College of Physicians the anatomy lectures founded by Theodore Goulston[17] were now being given, lectures endowed from a fortune made in part from Virginian tobacco. So considerable were his holdings of stock in the Virginia Company that in June, 1619, he was appointed to the committee "concerning the colledge in Virginia, being a waighty bisiness, and so greate that an Account of their proceedings therein must be given to the state."[18] You will remember how in July, 1621, Goulston was consulted on the appointment of a successor to the "physician's place in Virginia vacated by the death of Dr. Lawrence Bohun"[19] who had been killed in a sea fight with the Spaniards,[20] and how eleven years earlier Thomas, Lord De La Warre, Thomas Gates, and others had paid a tribute to Dr. Bohun when writing[21] to the Council of Virginia. They wanted more doctors and they lacked drugs, and they enclosed a list of these compiled by Bohun for the Council's guidance. Unfortunately the list has disappeared and we can only speculate as to the nature of the seasonal fluxes and agues they were designed to treat. English practitioners, and especially those who had served as sea-surgeons, were, however, familiar with the typhoid, dysentery, food-deficiency diseases, and malaria which these terms probably covered. Ipecacuanha and guaiacum had been introduced into Europe about 1577, when John Frampton described them in his *Joyfull Newes out of the Newe Founde Worlde,* but their use must have been limited, for George Wateson referred to neither when writing his book on tropical medicine[22] in 1598. If English surgeons had become familiar with them by the seventeenth century, the Virginian use of sassafras as a substitute for guaiacum was new to them.[23] Cinchona was used in England in the mid-seventeenth century for fevers of all types, but it was not always easy to obtain: Sir Thomas Browne when writing[24] to his second son, Lieutenant Thomas Browne, on board the *Mary Rose* bound for Cadiz in February 1667,

[17] J. J. Keevil, "Theodore Goulston, 1574-1632," *Bull. Hist. Med.*, 1953, *27*: 201-211; p. 201.

[18] A. Brown, *The Genesis of the United States*, 2 vols. (London, 1890), vol. 2 p. 906. See also T. Birch, *Court and Times of James I*, 2 vols. (London, 1849), vol. 2.

[19] Brown, *op. cit.*, vol. 2, p. 907.

[20] *Ibid.*, p. 830.

[21] British Museum, *Harleian MS.*, 7009, f. 58.

[22] G. W[ateson], *The Cures of the Diseased in remote regions Preventing Mortality incident in Forraine Attempts of the English Nation, London, 1598*, ed. C. Singer (Oxford, 1915).

[23] Hakluyt, *Principal Navigations*, vol. 8, p. 355.

[24] British Museum, *Sloane MS.*, 1745.

asked him to get some Jesuit's powder there; "and bring it in the bark," he wrote, "not the powder."

English practitioners were also familiar with scurvy both among seamen and in the ill-nourished population of cities. That scurvy should have occurred so frequently in Virginia at this time was a natural consequence of the prevailing views on the danger of eating unfamiliar fruits and roots. So frequently had these proved deadly to settlers and travellers that Sir Walter Raleigh issued instructions[25] to his squadron in 1617 that "you shall take especial care when God shall send us to land in the Indies, not to eat any fruit unknown, which fruit you do not find eaten with worms or beasts under the tree." It may have been this mistrust of fresh fruit and vegetables that led to scorbutic complications in Lord De La Warre's own case and to his attempt, in 1611, on Dr. Bohun's advice to seek relief in the Baths of Bourbon on the island of Nevis. You will remember how in his published apologia[26] for abandoning his governorship he described how he ultimately "found helpe for my health, and my sicknesse asswaged, by means of fresh Diet, and especially Orenges and Lemons, an undoubted remedy and medicine for that Disease."

If this seems strange so long after Sir Richard Hawkyns's successful use of oranges in 1593, we should remember that Hawkyns's account[27] was not published until eleven years after Lord De La Warre's illness, while John Woodall who had the account from Hawkyns and borrowed his views in detail but obscured them with all the pedantry of Hippocratic medicine, only published his opinions on scurvy[28] in 1617. James Lancaster's experience with lemon juice at the Cape during his voyage to the East Indies only appeared in print[29] in 1624. That these publications failed to ensure the prevention and cure of scurvy in the seventeenth century was due primarily to the authors in every case attributing the effects to the astringent qualities of the fruit juice, and many arguing that if this were all that was needed then any astringent chemical preparation

[25] Public Record Office, *State Papers Domestic*, xcii/9, May 13, 1617.

[26] T. West, Lord De La Warre, *The Relation of the Right Honourable the Lord De-la-Warre . . . touching his unexpected returne home* . . . (London, 1611).

[27] S. Purchas, *Hakluytus Posthumus*, Hakluyt Soc., Extra series, 20 vols. (Glasgow, 1905-7), vol. 17, p. 58 f. See also Sir R. Hawkyns, *Observations . . . in His Voyage into the South Sea* (London, 1622) and J. A. Williamson, ed., *Sir Richard Hawkyns Observations . . . in His Voyage into the South Sea, 1622* (London, 1933).

[28] J. Woodall, *The Surgions Mate* (London, 1617), p. 185.

[29] Purchas, *op. cit.*, vol. 2, pp. 392-437. See also Sir James Lancaster, *The Voyages of James Lancaster to the East Indies and the Voyages of Captain John Knight (1606) to seek the North-West Passage*, Hakluyt Soc. (London, 1877).

would do as well if not better. We can see the influence of this astringent theory in the case of John Conny, surgeon of the *Peregrine* of London in the mid-seventeenth century. Although his ship, a merchantman, only carried passengers on the relatively short voyage between London and America, Conny records[80] cases of scurvy in his log. Their occurrence is explained by his attitude towards the lemon juice he carried since he valued it only as a mouth wash; for the swelling of his patients' joints he preferred to place his trust in his powder *pro tumoribus*. It is not surprising that ship owners gave up providing their surgeons with lemon juice.

Like Woodall, all writers tried to reconcile the occurrence of scurvy with the ancient theory of a disturbance of the balance of the humours: it is an example of how, long after Harvey's introduction of the experimental method into medicine and throughout the scientific revolution of the seventeenth century, the voices of long dead schoolmen continued to echo down the corridors of time. In connection with scurvy we tend also to forget that in the sixteenth and seventeenth centuries there was less reading and less exchange of ideas than today. How else can we account for the following statement, made in 1572, being wholly overlooked when it so clearly indicated the insect vector of yellow fever and malaria? In that year, Henry Hawks, a merchant who had traded for five years at Vera Cruz in Mexico wrote home:[81] "This towne is inclined to many kinde of diseases, by reason of the great heat, and a certeine gnat or flie which they call a musquito, which biteth both men and women in their sleepe; and as soone as they are bitten, incontinently the flesh swelleth as though they had bene bitten with some venimous worme. And this musquito or gnat doth most follow such as are newly come into the countrey. Many there are that die of this annoyance." Hakluyt published this account in his *Principal Navigations* which appeared in two volumes between 1599 and 1600.

Perhaps the lack of interest in such a statement can best be understood if we consider how remote Mexico appeared to the ordinary seventeenth century Englishman, how lacking in curiosity were the small merchants and yeomen farmers representing the bulk of the families from whom medical practitioners were drawn. They disregarded travellers' tales and were more ready to listen to those of the peddling quack who long remained a popular figure in the English countryside. The orthodox practitioner in a country town had not only to complete with these men

[80] British Museum, *Sloane MS.*, 2779.
[81] Hakluyt, *Principal Navigations*, vol. 9, p. 379.

who could often show a royal license as well as the necessary civic permit to ply their trade,[32] but with women who in every well-conducted household kept their commonplace books filled with traditional herbal remedies, cordials, waters, ointments, and charms. Although I know of no record of women qualifying in England in the seventeenth century, there must have been a small number in practice in the sixteenth, for the records of Norfolk alone show one licensed by the Privy Council to practise physic in 1596.

In the seventeenth century the roll of women was more often that of nurse, a vocation to which many were led by the demands of the civil war and the long succession of battles round the English coast; the recurrent epidemics of plague, smallpox, and dysentery added to the already great demands made by cases of milder illness, accident, or the widespread malnutrition shown by the prevalence of rickets. The capability of many women to accept responsibility in a medical emergency can be see in the case of Elizabeth Alkin[33] who did so much to help the sick and wounded in the first Dutch war that she has earned the name of the Florence Nightingale of the Commonwealth.

Belief in the services of women in illness led General Venables not only to bring his wife with him on the expedition that captured Jamaica, but to persuade Admiral Penn to take on board his ships a number of women settlers from Barbados. Quoting his experience of their value during the recent fighting in Ireland, Venables succeeded in obtaining the ruling "that soldiers wives (who offer to carry their own provisions) may be transported to take care of sick and wounded men."[34] It provided an unfortunate precedent for a naval custom which lingered on into the nineteenth century and was much abused.

The services of women to the sick and wounded can be seen at their best in the hospitals of the period and, as there is no printed record of the life in these institutions, I would like now to turn to a description of the two state hospitals of the Savoy and Ely House in London. The situation which led to the nationalization of these two hospitals arose from the failure of the voluntary hospitals to meet the needs of the civil war and the successive Dutch wars, during which not only these two houses, but half the hospital beds in England were requisitioned by the

[32] Williams, *Barber Surgeons of Norwich*, pp. 27, 28.

[33] J. J. Keevil, "Elizabeth Alkin *Alias* Parliament Joan," *Bull. Hist. Med.*, 1957, *31*: 17-28.

[34] General Venables, *Narrative . . . 1654-5*, ed. C. H. Firk, Camden Soc., N.S. 60 (London, 1900), pp. 11 and 102.

government. The emergency arose at a time when the country had not fully recovered from Henry VIII's acts of confiscation a century earlier, by which the houses of pity, the maisendews, and the conventual hospitals had been closed. Out of the great number whose revenues were seized a total of some two hundred were never refounded. In the course of time the houses of healing began to replace the houses of pity, and scientific endeavour to supply what compassion had once struggled to give: in the seventeenth century, London had St. Thomas's hospital with 200 beds and St. Bartholomew's with 100, but Henry VII's hospital of the Savoy survived only as a poverty-stricken home for the poor. Ely House, formerly the town house of the Bishops of Ely, had become a military prison. In the first year of the civil war both the Savoy and Ely House were requisitioned as military hospitals,[88] but their full development came with the first Dutch war in 1652, when the number of sick and wounded from the fleet far exceeded the capacity of the coastal towns to absorb them. The Savoy then became a wholly surgical hundred-bed hospital, and at Ely House a hundred medical cases could be received.

At the Savoy, the wounded seaman, brought from the coast by an escort of four men, immediately recognized the familiar smell of burning pitch with which the hospital was fumigated. He found himself carried through a hall to one of four wards, known as Long Ward, Chapel, Newbury, and Reading, and placed on a wooden frame bed whose cord lacing was covered with a feather tick and bolster, sheets of unbleached linen hemmed and marked by the nurses, blankets and a woolen coverlet. Bed cases were supplied with a pewter chamber pot and bed stool and a supply of tow. In winter, the beds were prepared with a warming pan. The ward windows were curtained and screens were available. Dangerous cases had a night watch, the nurse sitting beside a candle in a tin or brass candlestick. If the patient died, a post-mortem examination was in many cases carried out, and the two surgeons may have taken the opportunity to teach their five mates some pathology. If, as in most cases, the patient had an amputation, he was given a bed-cradle; his wound was dressed with cotton dyed red, and bandaged with a linen roller made from surplices confiscated from the City churches and frequently laundered. When he got up, he was supplied with long crutches and later with an iron or wooden leg fitted with straps. All these appliances were made by the carpenters of the Savoy. Fracture cases were treated in wooden splints and the limb

[88] Public Record Office, *State Papers Domestic*, 16/DXXXIX, pt. 1/100, November 14, 1642.

placed between bolsters. Straw and leather trusses were provided for hernia patients. The up-patients had a certain measure of comfort, for there were mats on the floor, chairs, settles, and benches round the tables; on the wall were shelves for the nurses' use and a locked cupboard for the surgeon's. The up-patients may have helped in the kitchen, or the wardrobe, but a man was paid to carry coals and a woman to empty close stools. Patients were allowed leave except during the surgeon's rounds. Discipline was strict and was maintained by increasing fines or even by discharge. A recovered patient was fitted out with clothes.

At Ely House, a feature of the medical treatment was the use of heat. One ward was known as the Hothouse, staffed by two male nurses, and fitted with a copper bath: here elimination by sweating was carried out while the patients lay in baize coats and caps in the atmosphere of a Turkish bath. This treatment, chiefly employed for syphilitic cases, may account for the 110 sheets and many towels sent to the laundry in one week, and for the considerable quantities of beer that were drunk. The men also enjoyed an issue of clay pipes. Unfortunate patients with acute infectious diseases such as smallpox lay in an isolation ward with a watchman at the door.[86]

The increasing popularity of balneotherapy under the Commonwealth is shown not only by the use of steam at Ely House, but by Dr. Peter Chamberlen's attempt to obtain Parliament's consent in 1648 to the establishment of public baths in London. This development was defeated for two reasons: one was that Chamberlen wanted the monopoly of all the bath houses and the Long Parliament was aiming at the abolition of monopolies, the other reason was the opposition of the College of Physicians which argued that by their abuse in the Greek and Roman states they had been the cause "of so much physicall prejudice in effoeminating bodyes and . . . in debauching the manner of the people."[87] Nevertheless, interest in balneology persisted and you will recall how in 1660 the Royal Society sent an enquiry regarding "what hot Bathes & of what medicinall use" there might be in Virginia.[88]

I have referred to the Long Parliament's opposition to monopolies, of which one outcome was the undermining of the authority of the

[86] Regulations for the Savoy and Ely House, *State Papers Domestic*, 16/DXXXIX, pt. ii/231, November 15, 1642; Accounts for these hospitals, Commonwealth Exchequer Papers in *State Papers Supplementary*, 28/CIV, 28/CXLI A, 28/CXLI B, 1642-59.

[87] P. Chamberlen. *A paper delivered in by Drs. Alston, Hamaeus, Bates and Micklethwait . . . together with an answer thereunto* (London, 1648). See also J. J. Keevil, "The Bagnio in London 1648-1725," *J. Hist. Med.*, 1952, *7*: 250-257.

[88] *William & Mary Quarterly*, second series, 1921, *1*: 66.

Barber-Surgeons' and other guilds throughout the country. The ultimate effect of this in London was to be the establishment of independent medical teaching at St. Bartholomew's hospital in 1662 and at St. Thomas's before the close of the century. The rapid development of these and of private medical schools which followed was assisted by the increasing divisions in the Barber-Surgeons' Company between the two elements that Henry VIII had tried to unite within it. By the last decade of the seventeenth century the end of the union of surgeon and barber was in sight.

The new medical schools appear to have met with no opposition from the College of Physicians which was essentially a post-graduate corporation with a membership confined to a small number of university graduates and a prestige that declined after the civil war. It was symptomatic of this decline that in 1704 the House of Lords decided against the College and in favour of the Society of Apothecaries that there was nothing in the charter of either body to prevent an apothecary from prescribing for a patient without the advice of a physician.[39] Shortly before this, in 1695, a step towards the reunion of the profession was taken when Parliament passed an act officially recognizing a new class of surgeon-apothecaries in Edinburgh;[40] thus the ideal of the *medicus chirurgus* advocated by Woodall, Banester, Cooke, Wiseman, and many others throughout the seventeenth century was first realized in Scotland.

The seventeenth century with its two revolutions, that of 1642 when the royal authority was challenged, and that of 1688 when James II lost his throne, and above all the period of the interregnum and Cromwell's rule, left a permanent imprint on English life. In the course of this hundred years the feudal tradition of personal authority was replaced by the concept of the state, of public service, and of bureaucratic methods: a change took place in the social conscience and was expressed among other ways in a national sense of responsibility for the sick and wounded, the disabled, and the aged poor. The great Elizabethan Poor Law of 1601,[41] itself the climax of much sixteenth century legislation, was working effectively by the middle of the seventeenth, and a chain of responsibility had been established between the vestries, the higher local authorities and the central government. The German and Dutch system of town doctors, established on the continent in the sixteenth century, was introduced into England and civic medical appointments were much valued.

[39] Sir Z. Cope, "Influence of the Society of Apothecaries upon Medical Education," *Brit. Med. J.*, 1956, *1*: 1-6, p. 2.

[40] G. Parker, *Early History of Surgery in Great Britain* (London, 1920), p. 121.

[41] 43 Elizabeth, c ii, iii, *Statutes of the Realm*, vol. 4, ii, pp. 962-968.

The mayor and corporation permitted no medical practitioner to establish himself within their jurisdiction without their permission, following a scrutiny of his credentials either in the form of a license from a guild or from the bishop of the diocese, and such practitioners were required to join the local guild. From these practitioners they appointed one as town doctor and paid him *per capita* for attending cases in the hospital or the prison; the sick poor could obtain his services by application to the alderman of the ward in which they lived and his fee was paid by the corporation, much as in Virginia the vestry paid a surgeon for his attendance in certain cases.[43]

The town contributed to the cost of the journey of a patient to be touched for the King's Evil, the town clerk making the arrangements with the serjeant surgeon when the king was on progress in the neighbourhood. On one occasion, at Norwich, an alderman directed the town doctor to examine a child with sores "and to discourse Sir Thomas Browne thereabouts and report his opinion as to the cure."[44] This calling in of consultants can also be illustrated from the Norwich records, for on July 20, 1666, the town clerk was directed to provide himself for a journey to London the following Monday in the Flying Coach, there to treat with Dr. Hargrave and Mr. Boghurst "about their repayre to ys city to prescribe to, and visit the infected poore, and upon what terms they or one of them will undertake it." During the plague Norwich paid for surgeons and medicines for all plague cases, rented a house for their isolation, supplied clothes and bedding, and appointed a special treasurer to deal with the expenses during the whole emergency. When it was over the pest house was washed, aired, fumigated with sulphur, and the caretaker placed in quarantine for one month.[45] It is perhaps not generally realized how much of our state medicine has its origin in the seventeenth century or how only the death of Cromwell prevented a nationalization of the hospitals in London on the model of the Savoy—if one may so interpret the purpose of a "Committee of Parliament for the inspection of all Hospitalls and revenues belonging to them" set up[46] on September 1, 1659.

With seventeenth century bureaucracy had come attempts at standardization and methods of precision. John Graunt (1620-74) and Sir

[43] W. B. Blanton, *Medicine in Virginia in the Seventeenth Century* (Richmond, 1930), pp. 202-205.

[44] Williams, *The Barber Surgeons of Norwich*, p. 28.

[45] *Ibid.*, pp. 24-26.

[46] St. Bartholomew's Hospital, London, MS., Ha 1/5, f. 382 r (at back of journal).

William Petty (1623-87) were pioneers not only of medical and vital statistics but of the numerical method as applied to the phenomena of human society.[46] The records of deaths in London and throughout the country came to be carefully collected, classified, and studied. The navy introduced[47] sick returns from squadrons in 1625 and quarterly or half-yearly returns from the fleet were required under the Commonwealth.[48] Printed medical forms, closely resembling some now in use by the navy, were devised by James Pearse[49] during his years of office as its surgeon general between 1674 and 1689. Pearse also did much towards standardizing the assessment of disabilities and establishing a pension scale.

Although humoral pathology and traditional remedies and treatments continued to dominate physic, yet the apothecaries were slowly effecting a change which is partly reflected in successive editions of the *Pharmacopoeia Londinensis*. In the field of public health, the need for better water supplies and cleaner cities was gaining recognition, and if the advice given by the College of Physicians on measures to combat successive epidemics of plague appears somewhat obscurantist, yet those adopted by the navy in 1665 and 1666 were so effective that only one ship, the *Rupert*, reported any cases,[50] and no naval dockyard was infected in 1665. Everywhere the leaven of the Royal Society under its able secretary, Robert Hooke (1635-1703), was at work, or perhaps more truly the forces which had produced the Society were exerting their influence. The standard of surgical examinations advanced steadily after 1626 when the Barber-Surgeons of London established[51] their court of eight examiners; since in the middle decade of the century, this only passed between fifty and sixty candidates a year,[52] the examinations could be thorough. By the end of the century the examination for the license of the College of Physicians was extremely searching.[53] A standard procedure was also applied when making appointments to the surgical staffs of London hospitals: a selection committee would meet to consider the qualifications, experience, and general standing of the candidates as shown by their testimonials, and then

[46] M. Greenwood, "Medical Statistics from Graunt to Farr," *Biometrika*, 1941, *32*: 101-127, p. 102.

[47] J. Glanville, *The Voyage to Cadiz in 1625*, ed., A. B. Grosart (Camden Soc., 1883), p. 90.

[48] British Museum, *Add. MS.*, 9304, ff. 188-189, 192-193.

[49] Magdalene College, Cambridge, Pepysian Library.

[50] Public Record Office, *State Papers Domestic*, 29/CLVIII/88, June 12, 1666.

[51] Guildhall Library, London, MS., 5257/5, p. 49.

[52] *Loc. cit.*, MS., 5265/1.

[53] Yonge, *Journall*, 1702.

drew up a short-list of those for interview; in one case,[84] that of John Haselock, the committee at St. Bartholomew's appointed him in preference to a nominee of Cromwell himself, the Protector's candidate not being even short-listed.[85] In the case of physicians to the London hospitals, the appointments were still in the gift of the College of Physicians, a privilege which it jealously guarded.

No synoptic view can be taken of such a great span of years and of such a range of changing values, of scenes shifting from London to the provinces and of subjects varying from national events to happenings in a country town, but I have attempted to convey to you the influences that moulded the outlook of that venturesome company of members of our profession who made the month-long journey across the Atlantic and did not return to England. To Virginia they brought their own individual ideas and in Virginia they were free to test them in the hard school of the pioneer.

[84] St. Bartholomew's Hospital, London, MS., Ha 1/5 f. 120 r.
[85] *Loc. cit.*, MS., Ha 1/5, f. 117 v.

MEDICINE IN SIXTEENTH CENTURY NEW SPAIN AS ILLUSTRATED BY THE WRITINGS OF BRAVO, FARFAN, AND VARGAS MACHUCA*

SAUL JARCHO

The canons of historiography nowadays require the historian to set his theme securely in its social and economic background. While this is admirable doctrine, one could hardly dare, within the time and space allotted, to describe in detail the panorama of sixteenth century New Spain. Nor can one aspire to present a complete survey of the medical literature of that period, comparable to the famous essay of García Icazbalceta.[1] Instead it is more appropriate to adopt an eclectic method resembling the pathologist's biopsy—i. e. a few carefully chosen samples will be presented in the hope that these may yield a sufficient understanding of the scene. Of the three authors who will form the main basis of the discussion, one—Francisco Bravo—was a physician; another—Agustín Farfan—was a physician who became a friar, while the third—Bernardo de Vargas Machuca—endowed with neither scientific nor clerical sanctity, was a professional soldier. What can we learn from the writings of these three men about medicine and about New Spain of the sixteenth century?

In the time of the Hapsburgs the viceroyalty of New Spain included the entire Spanish domain north of Panama. It embraced the central kingdom of Mexico or New Spain proper, and the outlying areas of New Galicia, Central America, the Antilles, and the Philippine Islands. Each of the subordinate jurisdictions was a captaincy-general, except New Galicia, which was a presidency. The authority of the viceroy as president, governor, and captain-general covered all the area of the present republic of Mexico, except the western enclave of New Galicia, and extended to

* Read (in part) at the thirtieth annual meeting of the American Association of the History of Medicine: "Symposium on Colonial Medicine," sponsored jointly with the Medical College of Virginia Foundation, Richmond, Va., May 7, 1957.

[1] Joaquín García Icazbalceta, *Bibliografía Mexicana del siglo XVI*. Nueva edición por Agustín Millares Carlo. México, Fondo de Cultura Económica, 1954. See pp. 223-242: Los Médicos de México en el Siglo XVI. The reader will also find it profitable to consult Ignacio Chavez, *México en la cultura médica* (México, Edición de El Colegio Nacional, 1947), pp. 37-75.

Information of great value will be found in Francisco Guerra, *Historiografía de la medicina colonial Hispanoamericana* (México, 1953). See also (a) Francisco Guerra,

the Californias, New Mexico, the south central part of the present United States, and the shores of the Gulf of Mexico as far as the tip of Florida. The region west and northwest of Michoacán constituted the province of New Galicia, and embraced much of the present-day northwestern Mexico as far as the Rio Grande. New Galicia was at times politically subordinate to New Spain and at times partly autonomous.[3]

According to one estimate the population of New Spain in 1570 amounted to 3,555,000. Of these, 30,000 were white; 25,000 were negroes, mestizos, and mulattoes; and 3,500,000 were Indians.[4] By this time the aboriginal population of America was estimated to have suffered a reduction of 18 per cent since 1492.[4] For this decline the causes ordinarily alleged are war, communicable disease both autochthonous and imported, starvation, maltreatment, suicide, and cultural deracination.

The Spanish colonial administration was long regarded by the Anglo-American world as one of cruelty in action predominating over pious declarations of noble intent. Under scholarly analysis this so-called black legend has steadily lost credence. It is now recognized that Spanish administration was a complex mixture of paternalism, despotism, idealism, and suspicion, which attempted to reconcile a genuine solicitude for the welfare of the Indians with the economic interests of local landholders and merchants.[5] Thus the *encomienda* system, which was tantamount to the forcible recruitment and impressment of labor, was abolished in 1520, later reinstated, then repeatedly abolished and reintroduced throughout the remainder of the century.[6]

One characteristic of Spanish administrative technique may be singled out as a curiosity. In its eager search for factual information about new territories the government at Madrid had regular recourse to the questionnaire, a device which we erroneously regard as an annoying novelty of our own troubled and paternalistic times.

One of these questionnaires was prepared in 1570 by Juan López de

Bibliografía de la materia médica Mexicana. México, La Prensa Médica Mexicana, 1950. (b) Francisco Guerra, *Iconografía médica Mexicana* (México, El Diario Español, 1955).

[3] This paragraph is based on C. H. Haring, *The Spanish Empire in America* (New York, Oxford Univ. Press, 1952), pp. 76-77 and 79-80. See also Gonzalo Menéndez-Pidal, *Imagen del mundo hacia 1570* (Madrid, 1944).

[4] Angel Rosenblat, El desarrollo de la población indígena de América. *Tierra Firme* (revista trimestral), no. 1, 1935, pp. 115-183; no. 2, 1935, pp. 117-148; no. 3, 1935, pp. 109-141. See esp. no. 2, p. 128.

[4] Rosenblat, *op. cit.*, no. 3, p. 119.

[5] H. B. Parkes, *A History of Mexico* (Boston, Houghton Mifflin, 1950), pp. 88-89; pp. 91 ff.

[6] Haring, *op. cit.*, pp. 51-68.

Velasco, cosmographer and chief chronicler of the Council of the Indies.[7, 8] This document is entitled "Instrucción y memoria de las relaciones que se han de hacer para la descripción de las Indias." Its fifty questions deal not only with climate, geography, customs, and natural history but also with such matters as the indigenous population, and the causes of its decrease or increase; the healthfulness and unhealthfulness of localities; prevalent diseases; herbs and medicaments used by natives; hospitals, colleges, and charitable foundations; and "noteworthy effects of earth, air, and sky."

For the relatively remote district of New Galicia, we may accept the description of an obscure non-medical compiler Domingo Lázaro de Arregui,[9] who contrasts his own unprovided region with the opulent city of Mexico:

> The fact of our having very few who know any of the crafts makes it necessary for each of us to know them all; in this respect necessity forces us into everything. Thus in New Galicia and in New Biscay—which are farthest from Mexico, where everything is available—men are unquestionably more dexterous and unspecialized. Few will be found who cannot shoe and curry a horse, make a chair, bleed and shave, cut out a suit, take apart an arquebus and put it together, . . . train a horse, cope with a bull, draw up a petition or a lawsuit, or purge and medicate and treat a sick man.

Francisco Bravo

The earliest example of medical publication in Mexico[10] and in the whole of the New World is the work of Francisco Bravo. Bravo was born in Osuna in Spain. He began to practice medicine in 1553. and later came to Mexico. His work, *Opera medicinalia,* was printed in 1570.[11]

[7] Gonzalo Menéndez-Pidal, *op. cit.,* pp. 8-9; see also pp. 6 and 13.

[8] Haring, *op. cit.,* p. 104.

[9] Domingo Lázaro de Arregui, *Descripción de la Nueva Galicia* (1621). Edited by François Chevalier (Sevilla, Consejo Superior de Investigaciones Científicas, Escuela de Estudios Hispano-Americanos, 1946). See p. 39. It will be noted that Arregui wrote in a period slightly later than that of the other authors considered in this essay. The free translation is by S. J.

[10] The book by Pedro Arias de Benavides, *Secretos de chirurgía, especial de las enfermedades de morbo gálico* . . . (Valladolid, 1567), was printed in Spain and is therefore excluded from the present study. Guerra's *Iconografía* (see above footnote 1) mentions a book by Alfonso de Vera Cruz, *Phisica speculatio,* published in Mexico in 1557. I have not seen this work, which appears to be a treatise on physics, with incidental medical comment.

[11] Francisco Bravo, *Opera medicinalia, in quibus quam plurima extant scitu medico necessaria in 4. libros digesta* . . . (Mexico, Ocharte, 1570). Copy in New York Public Library; photostat in New York Academy of Medicine. Full bibliographic details in García Icazbalceta, *op. cit.,* pp. 221-223.

The reader is hereby warned that (a) the leaves of Bravo's book are numbered on

The text is arranged in a series of four essays, which deal with (I) typhus,[12] (II) venesection in pleurisy, (III) the doctrine of critical days, and (IV) the nature and properties of sarsaparilla.

The essay on typhus is entitled "Primus liber in quo de morbo (tauardete vulgariter dicto) qui per hanc Mexicanam prouinciam vulgariter grassatur copiose agitur." The text starts with an excellent clinical description, freely translated as follows:[13]

> The manner and form of invasion is this. A rather intense fever attacks those who are affected by the disease and persists in the same tenor without intermission for several days. With this are great distention of veins; severe aches and pains all over the body, especially in the head; . . . comatose symptoms and delirium; great redness of the face; thick reddish urine; large, vehement, fast, and frequent pulse; oppression of the heart; insatiable thirst; excessive dryness roughness and blackness of the tongue from combustion of the humors; heaviness of the temples; and most intense heat of the entire body. . . . In the skin of the whole body pustules break out which resemble mosquito bites, somewhat red or livid or black, concomitant with great intensity and ferocity of the symptoms. Such is the manner of invasion of this disease.

Having described the "essence" or essential characteristics of typhus in his opening chapter, Bravo found it necessary to devote his entire second chapter to the opinions of the Arab writers on the subject. He quotes Avicenna, Rhazes, Haly Abbas, and incidentally Fracastorius. He concludes that the disease is a fever of the blood, known to the Greeks as *sinochus*, to Avicenna as *asaf*, to Rhazes as *bothor*, and to Fracastorius as *febris puncticularis aut lenticularis*. In this connection it is interesting to observe that whereas Bravo and most of his sources compare the cutaneous lesions to mosquito bites, Rhazes, quoting a writer called Tabri, compares them—much more accurately—to flea-bites.[14]

Other chapters discuss the opinions of the Greeks, the classification of the disease, and the signs, causes, and treatment. The last few chapters are devoted to single important symptoms, such as stupor, mental alienation, insomnia and thirst.

Bravo repeatedly states his conclusion, based on Greek and Arab

recto only, hence references must specify *recto* or *verso*, and (b) that errors in pagination are numerous.

[12] Bravo uses the term *tauardete*, which can also be spelled *tabardete*, dimin. *tabardillo*.

[13] Bravo, *op. cit.*, p. 2r ff.

[14] Bravo, *ibid.*, p. 3r: "pustulae culicum morsibus similes." *Ibid.*, p. 6v: "Rasis decimo septimo continentis, capite quarto de febre sanguinis ex sententia Tabri sic scripsit: . . . apparent in corpore, id est, puncta minima sicut morsus pulicis." See also Rhazes: *Continens* (Venice, Bernardinus Benalius, 1509), fol. cccxciv *verso*.

authority, that typhus is a *sinochus* or continued fever caused by corruption of the blood. The disease is contagious and pestilential. It occurs in Mexico at all times of the year and kills most of those who are affected. He himself saw the disease in Seville in 1553, the year he began to practice medicine.[15] The eruption is a *iudicium* or crisis and is nature's attempt to expel the depraved and pestilential humor from the internal organs to the exterior.

Bravo attaches great etiological importance to putrid vapors from swamps. He therefore suspects that fish taken from swamps and lakes may be a contributory cause and advises that their sale be prohibited.[16] The city of Mexico is especially vulnerable to *tauardete* since it is surrounded by mountains, which prevent the pestilential vapors from escaping.

In accordance with the humoralistic and traditionalistic character of Bravo's thinking, the treatment of the disease consists of the removal of the peccant humors. Single chapters are therefore devoted to venesection, catharsis, enemata, cupping, and other purificatory techniques.

Taken as a whole the essay on typhus impresses one as the work of an experienced and widely read physician in whom learning preponderates heavily over observation. What little original thought the author reveals is devoted almost entirely to the evaluation of authorities. Although most of his attention is devoted to the Greeks and Arabs, contemporary writers such as Vallesius (1524-92) and Valleriola are not excluded. But it is the Greeks and the Arabs who predominate.

The same characteristics are evident in Bravo's second essay, a dialogue on venesection in pleurisy.[17] This work is a disputation in which the opinions of Monardus[18] are vigorously attacked. The essay is really a document in the controversy over the late Greek and Arabic use of venesection for derivation versus the Hippocratic venesection for revulsion. In this battle of words Monardus had taken up an Arabist position, whereas Bravo was anti-Arabist. The argument derived a certain additional relevance from the fact that a relative of Charles V had died of pleurisy despite treatment by the Arab method.[19]

[15] Bravo, *op. cit.*, p. 24v. For information as to the occurrence of typhus in Spain at about this time, see August Hirsch, *Handbook of Geographical and Historical Pathology* (London, New Sydenham Society, 1883-1886), vol. 1, pp. 548 and 570. See also Joaquín Villalba, *Epidemiología Española* (Madrid, 1803), vol. 1, pp. 99, 110-113.

[16] Bravo, *ibid.*, pp. 36v-37v.

[17] Bravo, *op. cit.*, pp. 97r-164r.

[18] Nicolaus Monardus, *De secando vena in pleuriti* . . . (Antwerp, 1564).

[19] J. H. Baas, *Outlines of the History of Medicine and the Medical Profession.* Transl.

The traditionalism of Bravo and of his intellectual environment is demonstrated quite clearly in a discussion of the pulse. Bravo states that his failure to observe a certain type of pulse described by Galen must be due to weakness and inexperience of observation, implying thereby that Galen could hardly have been in error on any important matter.[20]

Despite the dense jungle of metaphysical and theological argument a few gleams of intellectual life are discernible. These are to be found in the vigor and keenness of the disputation and in the abundant reference to recent or even contemporary authors, such as Amatus Lusitanus,[21] Laurent Joubert,[22] and Leonhard Fuchs.[23] Vesalius is appropriately described as " viro in anatomicis indagandis sectionibus omnium consensu peritissimo, ac exercitatissimo." [24]

We may deal more briefly with Bravo's two remaining essays, the Critical Days [25] and the Sarsaparilla.[26]

The essay on critical days is a scholastic argument based on Hippocrates, and including incidental attacks on Galen, Averroes, Augerius Ferrerius (1513-1588), and others. Bravo digresses widely to discuss periodic phenomena in general. Rejecting astrological explanations, he concludes that periodicity is due to the intrinsic operation of Nature.[27] This feeble conclusion is a poor reward to the reader who has waded through sixty folia (*recto* and *verso*). At the very end of the philosophy common sense breaks in and the author declares that in urgent sicknesses the indication of the critical day should be disregarded.

The essay on sarsaparilla root is the fourth and last in Bravo's collection. It is an effort to prove that this root is hot and dry, not cold and dry as Mexican physicians wrongly asserted.[28] Consequently it might prove fatal to persons afflicted with cold sicknesses. The text is of minor interest as an example of the method by which the properties of a drug

and revised by H. E. Handerson (New York, Vail, 1889), pp. 375-376. Maximiano Lemos, *Historia da medicina em Portugal* (Lisboa, Gomes, 1899), vol. 1, pp. 301-302.

[20] Bravo, *op. cit.*, pp. 100r-100v.

[21] Bravo, *ibid.*, pp. 133v ff.

[22] Bravo, *ibid.*, p. 109r.

[23] Bravo, *ibid.*, p. 132v.

[24] Bravo, *ibid.*, p. 134v. See also pp. 140v and 141r.

[25] *Opusculum de diebus decretoriis. Ibid.*, pp. 164v-258v.

[26] *Digressio radiculae quae vernacula lingua Zarcaparrilla dicitur. Ibid.*, pp. 258v-303v.

[27] *Op. cit.*, p. 222v-230v.

[28] See for example the description by the famous Francisco Hernández (1517?-1587): *Historia de las plantas de Nueva España* (México, Imprenta Universitaria, 1942-1946), vol. 3, pp. 757-761.

were established. The drawings are probably the earliest botanical illustrations published in the New World.

Mexican medicine as reflected in Bravo's *Opera medicinalia* is strongly traditionalistic. The Greek and Arab writers were studied in great detail and were the subject of intense interest and vigorous discussion. Modern authors were not excluded but were usually refuted in favor of the Greeks. The contemporary scene provided fresh subject matter, such as epidemic disease or indigenous plants, which was forced into the old forms of thought. The enlargement of the realm of facts caused no trespass on the realm of the old ideas.

Agustín Farfan

In 1579, nine years after the essays of Bravo, there appeared the treatise of Agustín Farfan (d. 1604), entitled *Tractado breve de anothomia y chirugia, y de algunas enfermedades, que mas communmente suelen hauer en esta Nueua España.*[29] Farfan was one of the physicians of Philip II. Later in his career he came to Mexico, where in 1568 he entered the Augustinian order. In 1569 he became Professor of Medicine.[30] He died in 1604. It is instructive to consider both the first and the second[31] editions of his book.

In the first edition, published in Mexico, 1579, Farfan tells us that he has been practising medicine and surgery for 27 years. He has decided to take from outstanding Greek, barbarian, and modern authors the best of what they wrote on surgery, so that surgeons shall be able to find whatever information they need, while those who have no surgeons or physicians will also be able to cope with their medical problems.

The 274 leaves of the 1579 edition contain an almost complete treatise on medicine, divided into six books, i. e. (I) preface; anatomy; (II) and (III) apostems; (IV) fresh ulcers; (V) chronic ulcers, including syphilis; and (VI) recognition and treatment of common diseases.

At the outset Farfan says that there are two kinds of surgery, (a) surgery of soft parts—such as flesh, nerves, sinews, panniculus—and of

[29] Printed by Antonio Ricardo, Mexico, 1579. 274 leaves, numbered on *recto* only. Copy in Henry E. Huntington Library; photostat in National Library of Medicine; microfilm to be deposited in New York Academy of Medicine. Detailed bibliographical information in García Icazbalceta, *op. cit.*, p. 300.

[30] García Icazbalceta, *op. cit.*, p. 236.

[31] Agustín Farfan, *Tractado brebe de medicina, y de todas las enfermedades . . .* (Mexico, Pedro Ocharte, 1592). Facsimile in *Colección de incunables Americanos. Siglo XVI*, Vol. X. (Madrid, Ediciones Cultura Hispánica, 1944), VIII + 353 + IX pp.; text pages are numbered on *recto* only.

parts that are neither hard nor soft, and (b) surgery of hard parts such as bone and cartilage. The surgeon must know the parts of the body and the complexions, duties, and faculties thereof. The members of the body are engendered by the first commixtion of the humors. Simple members are ten in number, viz. nerves, muscles, ligaments, veins, arteries, etc. According to Hippocrates, says Farfan, the accidents and affections of muscles are the same as those of nerves. Muscles, like nerves, are cold and dry. Of the simple members, some are spermatic and take their origin and birth from the seed or sperm of the male, and "they are called spermatic because they have no other name." [82]

It speedily becomes apparent to the reader that Farfan's physiology is Galenic. Indeed the ancient system of humors is expounded at the beginning of the text and is reinforced throughout later chapters by profuse quotation from Galenic treatises.

The discussions of anatomy represent a similar stage of scientific development. Thus, the commissures of the skull are said to have been made for the following purposes: [83] to allow entry of the veins which carry nourishment to the brain, to allow exit to the nerves and filaments which arise in the brain, and to allow exit to the vapors which arise in the brain. Arteries and veins carry vital spirit from the heart to the pia to the brain, where it is converted and subtilized into animal spirit.[84] The brain has three ventricles arranged in tandem. The third or posterior ventricle, according to Galen, is the seat of imagination, cogitation, and memory. The anterior ventricle is paired. Disease in the panniculus or membrane which covers the brain causes hemicranial pain [*axaqueca;* cf. modern Spanish *jaqueca,* migraine]. A hot apostem or abscess [in the meninges?] causes frenzy; a cold apostem causes lethargy or stupor.[85] The anterior part of the brain abounds in blood, the posterior in phlegm, the right in choler, the left in black bile. The right side of the brain is the hottest.[86]

The apex of the heart is at the right. It is felt on the left because there the arterial vein [pulmonary artery] arises which causes the pulsation and movement.[87]

The heart, as Rhazes says, has two large ventricles, one on the right and one on the left. Between and above these is a third ventricle, which resembles a box [the atria]. The right ventricle has two orifices, which were made by nature; one is for the entry of the veins which convey blood

[82] Farfan, 1579, p. 4 *verso.*
[83] *Ibid.*, pp. 7 *recto* and *verso.*
[84] *Ibid.*, p. 8r.
[85] *Ibid.*, p. 9r.
[86] *Ibid.*, p. 9v.
[87] *Ibid.*, p. 15v.

from the liver, the other is for the exit of a vein. "And thus many anatomists, accepting the opinion of Rhazes, call it the arterial vein."[38] As long as life continues, the arteries pulsate and move in order to carry the vital blood which is engendered and made in the heart.

At the end of the large intestine there are five veins for purgation of melancholic blood. For this reason they are called haemorrhoidal veins or veins of *almorranas*.[39] The spleen has two openings. One conveys a small amount of melancholic humor to the stomach, in order to provoke hunger; the other receives melancholic humor from the liver.[40] The omentum arises from the panniculus carnosus, as Mundinus says.[41]

These quotations and paraphrases are sufficient to describe the Galenic and mediaeval character of Farfan's writing on anatomy and physiology. The same traits are apparent in the clinical sections of the treatise. For example in the discussion of apostems (abscesses), the text is divided into (a) essence and definition (b) classification (c) causes (d) signs, recognition, and prognostics (e) treatment. The authorities quoted in this section include Galen, Hippocrates, Aristotle, Serapion, Avicenna, Rhazes, Averroes, Albucasis ("a respected author among the barbarians),"[42] Avenzoar,[43] Theodoric, el Conciliador (probably Petrus Abanus), Lanfranc, Arnaldo (de Villanova?), and Guy de Chauliac. The most recent author quoted in this section is Juan de Vigo (1460-1520), who had died more than fifty years before Farfan appeared in print. There is a passing reference to rhinoplasty, which reflects the influence of Tagliacozzi[44] or perhaps of Francisco de Arceo.[45] There is one reference to a personal experience with experimental surgery. This proves to be nothing more than a repetition of Galen's famous section of the recurrent laryngeal nerves. The variety and accuracy of Farfan's quotations show that large collections of manuscripts and books were available in Mexico at the time and also disposes of the quaint notion that the glut of medical literature is a new phenomenon.

[38] *Ibid.*, p. 16r.
[39] *Ibid.*, p. 20r.
[40] *Ibid.*, p. 20v
[41] *Ibid.*, p. 21r. Other references to Mundinus occur on p. 24v (bones of lower extremity) and p. 28v (the "reversive" nerves).
[42] *Ibid.*, p. 45v.
[43] The list reminds one inevitably of the *Canterbury Tales* (A 429-434) and of Dante's "Ippocrate, Avicenna e Galieno, Averrois che il gran comento feo" (*Inferno* IV. 143-4).
[44] Farfan, 1579, p. 160v. "Algunos sacan las narizes de los braços, ligandolos con la cabeça, por espacio de ochenta dias. . . ."
[45] See W. Deuchler, *Juan de Cárdenas* (Bern, 1930), p. 6. See also E. García del Real, *Historia de la medicina en España* (Madrid, 1921).

The copious monkish citation of ancient and mediaeval authors is tinctured occasionally with Farfan's personal experience. This sometimes leads to curious contrasts. Thus in a discussion of arrow wounds, Farfan refers to Henricus de Mondeville *de extrahendis sagittis,* and then mentions the flint arrowheads of the Chichimeca Indians.[46]

In the evaluation of authorities Farfan rarely is willing to disagree with Galen,[47] but he is not reluctant to controvert more recent authors such as Guy de Chauliac[48] and Juan de Vigo.[49]

In the chapters which deal with syphilis and typhus (*tauardete*), Farfan suddenly and conspicuously abandons the citation of authorities, although his ideas do not part company with those of Galen and the Middle Ages.

Syphilis is discussed in Book V[50] of his text, which deals with chronic ulcers. The disease, he tells us, is so pernicious, filthy, ugly, and fetid as to cause disgust. In some patients it produces a sort of scabies or leprosy, either local or general. In others it produces something resembling indurations, or crusts, or pustules on the head, trunk, or legs. Some lose the hairs of the scalp or eyebrows or eyelashes. Others develop warts or foul, corrosive, and dirty ulcers, and corruption of the bones. Others have pains, fever, or a thousand kinds of symptoms.

The disease, he says, has many causes. These include corruption of the phlegmatic humor or of the melancholic humor or both. It is also caused by the corruption of adust melancholic humor, as a result of the blood being previously corrupted in those who are swollen with scabs and corrosive and cancerous ulcers. It may also be produced by excessive contact with women, which weakens the liver and causes it to produce corrupt and feculent blood. A further cause is contact with women who are diseased and ulcerated in the genitalia. By lasciviousness the liver is weakened; buboes appear in the groins, which serve as emunctories or sewers for the liver. There are other causes "which to avoid prolixity I do not mention" but it is enough to state that in most instances the disease comes from phlegmatic and melancholic humor mixed. Hence the physician must attend to the evacuation of this humor.

It is necessary first of all to consider the (humoral) complexion, virtue, and disposition of the patient and the humor or humors principally

[46] Farfan, 1579, pp. 124r and v.
[47] See however p. 155r on recovery from wounds of the brain involving loss of substance.
[48] Farfan, 1579, pp. 131r, 203r.
[49] *Ibid.*, p. 203v.
[50] *Ibid.*, Farfan, 1579, pp. 210v *et seq.*

responsible in the individual case. If the syphilis has been caused by a hot humor from corrupted blood, the pustules are large, red or vermilion, and painful; the face is red, the eyes are engorged; the patient is fleshy and somewhat warm. He should be given at the start two phlebotomies from the basilic vein, since this is connected with the liver. Then a variety of syrups and purges must be administered. A different regimen is necessary if a different humoral complexion is predominant. Other treatment, according to circumstances, may include sarsaparilla, guaiac, ointment containing white lead and litharge, mercurial inunctions, or fumigations. The latter Farfan opposes.

It is in the discussion of syphilis, devoid of literary citations, based on abundant European and Mexican experience, yet strongly influenced by Galen and the Arabs, that the Middle Ages meet the modern world. We are reminded of the comment attributed to Boerhaave [51] that "Mercury cures the Pox by Properties very remote from any comprized in the Classes of the galenic Scheme."

The 1579 edition of Farfan's book contains many incidental treasures which tempt the scholar and illuminate the period. Thus "weakness and indigestion of the stomach" are common at all ages. The foods eaten in Mexico are hot and humid, conforming to the humoral complexion of the country, and hence are weak, whereas the foods of Spain are solid and nutritious. In Spain people are healthier than in Mexico and live longer. The idleness so prevalent in Mexico is conducive to overeating and overdrinking.[52]

Typhus [53] (*tauardete*) is a continued fever, in which the symptoms are greater or less in quantity or quality according as the humor is more or less bad. The disease is caused by blood as antecedent cause and choler as conjoined cause. The blood changes its nature by corruption; the subtle part is converted to choler, while the feculent and gross parts turn to black bile. Although some say that typhus is caused by pestilential air and by living near swamps and vapors, this cannot be the sole cause, since the disease occurs in people who do not live near stagnant water.

In 1592, after an interval of 13 years, Farfan issued the second edition of his book. The title was changed from *Tractado breve de anothomia y chirugia* . . . to *Tractado brebe de medicina*. . . . The newer edition places increased emphasis on the needs of laymen. Indeed Farfan states

[51] *Dr. Boerhaave's Academical Lectures on the Theory of Physic*. . . . Third edition, corrected (London, 1766), vol. 1, p. 34, n. 4.
[52] Farfan, 1579, p. 223v ff.
[53] *Ibid.*, pp. 227r-235v.

that the work is intended especially for persons who do not have access to physicians or drugstores.[54] The material has been rearranged and amplified, the clinical and practical discussions being promoted to primacy. Thus Books I to III deal with general medicine, Book IV is devoted to surgery, and Book V is called Brief Anatomy. Much of this change is merely one of rearrangement without alteration of wording. The ancient humors are preserved intact and are explained with a clarity which makes the book an excellent introduction to Galenic medicine. The anatomical descriptions retain the five-lobed liver,[55] the septipartite sternum,[56] the right kidney higher than the left,[57] and fourteen bones in the maxilla.[58] These stigmata of antiquity are set forth half a century after Vesalius' *Fabrica*.[59] Although he wrote in the period between the time of Vesalius and that of Harvey, Farfan is clearly pre-Vesalian as well as pre-Harveian.

One interesting change in the second edition concerns therapeutics. In the treatment of each major disease Farfan now recommends confession as the first therapeutic measure. This doubtless reflects the thirteen additional years which he had spent as an Augustinian friar, or it may indicate the pressures of the ecclesiastical hierarchy.

The interpenetration of clerical and clinical medicine is evident in the opening chapter, which deals with "weakness of the stomach." Farfan says:[60]

> It is a shame—and a great one—to see in New Spain those who complain of weakness of the stomach and of not being able to digest their food, little though this might be. Some people, if they eat what they long for and what their stomachs desire, cannot digest it. Others vomit what they eat, and throw up with it a large quantity of putrid and acid humor. Others belch up ventosities all day long and continually spit up phlegm, and vomit it up coagulated like eggwhite. . . .

The causes, says Farfan, are numerous, but the commonest are bad order and bad regulation in eating and drinking. He then goes off into a truly clerical and mediaeval sermon on gluttony. He comments incidentally on the dangers of postprandial coitus and he informs us that children conceived at such times are sick and weak.

[54] Farfan, 1592, *op. cit.* (see above, footnote 31), pp. iv, 1v, 33v.
[55] *Ibid.*, p. 341r.
[56] *Ibid.*, p. 336v.
[57] *Ibid.*, p. 343v.
[58] *Ibid.*, p. 333r.
[59] For the retention of some of these antique errors by Vesalius see C. Singer and C. Rabin, *A Prelude to Modern Science* (Cambridge Univ. Press, 1946), p. xliii *et seq.*
[60] Farfan, 1592, p. 1v ff.

Another vignette of Mexican life occurs in the chapter on "retention of the menses."[61] The main cause of bad menstruation is a thick phlegmatic state of the blood, caused by overeating, idleness, and lack of exercise.

> . . . These things the women of New Spain do very well, because at all hours of the day and many hours of the night they can be seen eating dainties; especially cacao is eaten and drunk, and this must never be lacking. Other women stuff themselves with chocolate, which is a drink made of many things incompatible with one another, and bad for digestion. . . . These things fatten the blood and obstruct and cover the veins, as if with rock and mud. . . . May God enlighten their understanding so that they do not take death with their hands.

Another interesting aspect of Farfan's second edition is the increase in the number of Mexican drugs. While much of the traditional Greek and Arab pharmacopoeia has been carried over from the previous edition —preparations like agaric, diacatholicon, philonium, mastic, and oil of roses—there is a notable increase in the mention of Mexican products such as matlaliztic, uli, and istafuiatl. The root of Michoacán[62] had been recommended repeatedly in the earlier edition. The Americanization of the pharmacopoeia represents an acculturative process which was also to occur in British and French America.[63] As is well known, botanical, pharmaceutical, and agricultural knowledge constitutes an important part of America's contribution to European culture.

For another index of medical practice in New Spain it is convenient to turn to Farfan's discussion of syphilis in the 1592 edition,[64] since we have already adverted to his earlier presentation of the same subject. While much of the material has been transposed verbatim from the first edition, the improvement in the order of exposition makes the newer text more instructive for analysis.

Syphilis, he tells us, is easy to treat at its onset. There can be no single method of treatment because the causative humors and the accidents [symptoms and signs] differ in different cases. Ignorant practitioners and quacks do not recognize that it is basically necessary for the therapist to know the humoral complexion of the individual patient.

[61] *Ibid.*, p. 33r ff.

[62] This root did not escape the notice of Benjamin Franklin and Cadwallader Colden. See A. H. Smyth (editor), *The Writings of Benjamin Franklin* (New York, Macmillan, 1905-7), vol. 3, p. 87.

[63] Note for example the successful treatment of scurvy among the followers of Cartier by Canadian Indians. H. S. Burrage (editor), *Early English and French Voyages* (New York, Barnes and Noble, 1952), p. 76 (also New York, Scribner, 1906).

[64] Farfan, 1592, pp. 82r-98r.

After the customary discussion of phlebotomy and purgation, Farfan devotes successive chapters to treatment by sarsaparilla, guaiac, inunction, and fumigation. The formula for inunction [65] includes butter, pig fat, the oils of laurel, dill, and camomile, marshmallow, mercury oxide, and cork ashes. An alternative formula for rich patients contains pig fat, cow fat, theriac, mercury oxide, litharge, ginger, cinnamon, clove, nutmeg, rose, amber, and musk. Thus the rich man received not only salubrious mercury [66] and the spices of the Orient but he might also develop lead poisoning because of the litharge (lead monoxide).

For fumigation [67] the patient was placed in a small tent and exposed to the vapor from pastilles made of cinnabar or vermilion, mastic, litharge, orpiment, incense, and storax. Cinnabar or vermilion is mercuric sulphide, litharge is lead monoxide, and orpiment is arsenic trisulphide. Hence it is not to be wondered that Farfan found this treatment dangerous and condemned its use.

In the present psychiatric and psychopathic era we cannot overlook Farfan's chapter on melancholia.[68] This disease, he says, is surprisingly common. Men or women scarcely reach the age of twenty when they begin to complain of it. The symptoms include fear of death, loss of appetite, insomnia, fears about the heart, and pressure in the throat. Melancholia should be treated by severe reprehension.

The disease is of two kinds. Natural melancholy, which is cold and dry, comes from the lees of the blood. Black choler or sullen melancholy comes from choleric humor concocted with excessive heat. The latter ailment comes from natural melancholy; it arises in the liver with other humors in proportions determined by the humoral constitution of the individual. A temperate climate is of therapeutic value. Other recommendations include sleep, exercise, amusing conversation, diverting activities, music, phlebotomy, the ingestion of vinegar, and a close haircut.

Since Farfan's book does not often come to the attention of the modern reader, we must rescue from oblivion a few of his minor remarks, even at the risk of digressing. In cases of "dizziness of the head" [69] if the scene seems to rotate, the imaginative virtue is damaged; if the scene appears black, the visual virtue is damaged also. Techniques are given

[65] *Ibid.*, p. 93v ff.

[66] For a curious contemporary Mexican discussion of the properties of mercury see Juan de Cárdenas, *Problemas y secretos maravillosos de las Indias* (Mexico, Ocharte, 1591; Facsimile edition, Madrid, Ediciones Cultura Hispánica, 1945), pp. 100v-105v.

[67] Farfan, 1592, p. 97r ff.

[68] *Ibid.*, pp. 107r-113v.

[69] *Ibid.*, p. 138r ff.

for elevating a depressed xiphoid and a depressed coccyx;[70] the latter may be caused by riding horseback. Migraine is treated by anointing the head with goat feces macerated in vinegar[71] (genuine *Dreckapotheke*). Treatment is described for disturbances of the stomach and head in literary persons.[72] Indians tolerate phlebotomy poorly, since they eat little while healthy and almost nothing when sick; they die mostly of hunger and thirst.[73] Uli (latex) is used for the eyes, for diarrhoea, and for haemorrhoids.[74] Scorpion sting is cured by the point of the human penis.[75]

We may summarize the work of Farfan by observing that, as is the case with Bravo, his lack of originality makes him a typical object for study while it does not deprive him of a very definite charm. Like Bravo he is predominantly traditionalistic, but unlike Bravo his work shows no trace of recent progress in medicine. His work is heavily permeated by religious influences. His long experience as a physician made him familiar with the lazy indulgent life of the wealthy, the frailty and starvation of the Indian, and with the impostures of quacks. His choice of drugs is clearly marked by Indian discoveries, some of which were to be a permanent accession to medical practice.

Bernardo de Vargas Machuca

Violating the unities of time and place we may now turn to a writer who was a late contemporary of Bravo and Farfan but who really represents a somewhat earlier cultural phase, namely the stage of conquest, and whose observations refer not merely to the viceroyalty of New Spain but rather to the entire Spanish colonial domain during its pangs of subjugation. That writer is Bernardo de Vargas Machuca (1557-1622), a professional soldier who had spent seven years as a warrior in Italy and more than twenty in campaigns in the New World. His book, *Milicia y Descripción de Las Indias,* was published at Madrid in 1599.[76] This fascinating work is really a treatise on the art of conquering newly discovered countries; hence it might be called a conquistador's handbook.

[70] *Ibid.*, p. 154v.
[71] *Ibid.*, p. 129v.
[72] *Ibid.*, p. 163v.
[73] *Ibid.*, p. 179v.
[74] *Ibid.*, p .193v.
[75] *Ibid.*, p. 203r. "Esperiencia es hecha muchas vezes, que en qualquiera picadura de Alacran si llegan á ella tres vezes ó quatro la punta del miembro de vn niño ó de vn hombre, quita muy facilmente el dolor, y sana."
[76] Bernardo de Vargas Machuca, *Milicia y descripción de las Indias* (Madrid, Pedro Madrigal, 1600). Copy in Hispanic Society of America. I have used the edition published at Madrid in 1892 by Victoriano Suárez, 2 vols.

It deals with problems of command, problems of supply, and problems of tactics. Although the author's experience would seem to have been acquired in South America and not in Mexico, his book is a generalized statement of the conditions of American conquest and serves our purpose even better than the more famous writings of Bernal Díaz del Castillo and Cortés.

Vargas Machuca tells us that the commanding officer of an expedition against Indians should be between thirty and fifty years of age. He must be able to do everything. At times he must act as physician and surgeon; he must help carry a stricken soldier and must be willing to walk barefoot if the soldier needs shoes.[77] He must provide medicines for the natives. He must be able to walk day and night, in winter and summer, in fair weather and foul. He must be able to tolerate hunger, thirst, mosquitos, ticks, and fleas; he may even lose his feet because of chiggers. He must be prepared for rattlesnakes, caymans, poisonous fishes, and poisoned arrows.[78] Sick or syphilitic men should be excluded from his expeditions; fat, old, or intranquil men are also undesirable.

Vargas Machuca devotes a special chapter to the supply and use of medicines on expeditions.

> The surgeon should be instructed to take with him a number of mild cathartics, such as mechoacan and oil of figs. He should also have tobacco, sugar, corrosive sublimate, balsam, sulfur, theriac, and the bezoar stone. The diseases encountered will include wounds poisoned and unpoisoned, colds, fevers, diarrhoea, swellings, burns, poisoning from ingested herbs, pleurisy, earache, toothache, and pressure in the chest from altitude sickness.[79]

For wounds caused by poisoned arrows, the commander should immediately order the surgeon to lift up the injured flesh with a hook and slash it away with a razor. A small pellet of corrosive sublimate and tallow should be put into the wound to inactivate the poison. Over this a mass of flour, salt, gunpowder and ashes should be placed for hemostasis. Other valuable remedies are theriac, ground clams, and St. Martha's amber. No drinking water should be given. If the patient is not treated promptly he will die rabid.[80]

Colds are common on military expeditions. The treatment consists of

[77] Vargas Machuca, 1892 ed., vol. 1, p. 47.

[78] *Ibid.*, vol. 1, pp. 75-77.

[79] Altitude sickness had been described eight years earlier by the sagacious Fray Joseph de Acosta, *Historia natural y moral de las Indias* (Seville, 1590). Reprinted Madrid, Ramón Anglés, 1894, 2 vols. See vol. 1, pp. 206-209 (Bk. III, chap. 9).

[80] Vargas Machuca, 1892 ed., pp. 126-128.

sulfur taken internally, or decoction of manchineel, or inhalations of tobacco smoke.

Everyone, says Vargas Machuca, is so well able to recognize fevers and to bleed and purge, that no details need be given. However, for a confirmed tertian or quartan, there is nothing so good as a ground snakeskin in soup or wine. The patient should then be purged with a decoction of tobacco.

Snakebite is common among soldiers because marches are often made at night when snakes are active. The wound should be slashed, then sucked out with a straw, then treated with corrosive sublimate.

In summarizing his therapeutics, Vargas Machuca says: "I have tested out all these medicines; some came from the Indians, who are great herb-doctors. . . . Some I have discovered through experience and through good philosophy." [81]

The experienced commander did not limit himself to surgery and pharmacotherapy but was interested also in public health. He recommends that when a conquered territory is settled, attention should be given to its salubrity. This can be judged by observation of the inhabitants, their number, and their physical development. If aged persons are numerous the country is likely to be healthful.[82]

The Indians, he says, are miserable in sickness and let themselves die of sadness. When a confirmed pestilence breaks out among them, none escape, since they are people of little spirit.[83]

The "conquistador's handbook" fills out our understanding of sixteenth-century Spanish medicine in the New World, since it shows us the world of the layman and the medico-military organization of the moving frontier, where diagnosis was simple and treatment prompt, where no one had read Galen but everyone could bleed and purge to remove humors, and where the emergencies of military life made Indian remedies acceptable without imposing the barriers of doctrine.

* * * * * *

Vargas Machuca ends his book with a brief gazetteer and geography of the New World. Speaking of Bahama Channel he finds that from that place northward to Labrador there is nothing worth mentioning. With this final blast from the conquistador's arquebus, I await with interest the comments of the other symposiasts, who will discuss the history of Massachusetts and Virginia.[84]

[81] *Ibid.*, vol. 1, pp. 139-140. [82] *Ibid.*, vol. 2, p. 30. [83] *Ibid.*, vol. 2, p. 93.

[84] The author takes pleasure in acknowledging the numerous courtesies accorded him by the staff of the Malloch Rare Book Room of the New York Academy of Medicine.

MEDICAL PRACTICE IN COLONIAL AMERICA*

WHITFIELD J. BELL, JR.

In the late winter of 1775 some inhabitants of Northampton County in northeastern Pennsylvania sent a petition to the Assembly at Philadelphia. "Many Parts" of their county, they complained, were "infested with a Set of Men, who taking upon them the Offices of Physicians and Surgeons, (though in Reality no better than Empiricks or Quacks) administer Drugs so unskillfully and ignorantly, that some Persons have, in all Probability, thereby lost their Lives, and others been rendered Cripples." To protect themselves from all such, the petitioners asked for a law to forbid any, "except those of established and unquestionable Reputation," to practice medicine or surgery "until he or they have first undergone an Examination before two or more skilful and judicious Physicians of the City of *Philadelphia*"; the results of this examination, if favorable, to be reported to two or more judges of the Supreme Court, who would issue a certificate accordingly. Such regulations, the Northampton County petitioners continued, if extended over the whole province, "would have a very salutary and good Effect by encouraging Men of real Learning and Ability in those Professions to settle among them."[1]

The plaint of these Pennsylvanians was not an uncommon one in eighteenth century America. Certainly the conditions they complained of were general enough. Families in sparsely settled areas were often beyond the reach of physicians, while many persons, in towns as well as in the country, had to put up with ignorant or unskilful doctors or do without. In this situation colonial governments, both provincial and town, from time to time projected systems of examination and licensure for physicians and tried to control the fees exacted by "avaricious and griping" practitioners. The legislation, however, specified no standard of education or achievement, made no provision for enforcement; and physicians continued to practice and, if they were observant and thoughtful or only fortunate, continued to prosper with no other sanction than the approval of their patients.[2] "Few Physicians amongst us are eminent for their Skill," wrote William Smith in his history of New York in 1757.

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[1] *Pennsylvania Archives*, 8th ser., VIII, 7197.

[2] Carl Bridenbaugh, *Cities in the Wilderness: The First Century of Urban Life in America, 1625-1742* (New York, 1938), pp. 88-91.

Quacks abound like Locusts in *Egypt*, and too many have recommended themselves to a full Practice and profitable Subsistence. This is the less to be wondered at, as the Profession is under no Kind of Regulation. Loud as the Call is, to our Shame be it remembered, we have no Law to protect the Lives of the King's Subjects, from the Malpractice of Pretenders. Any Man at his Pleasure sets up for Physician, Apothecary, and Chirurgeon. No Candidates are either examined or licensed, or even sworn to fair Practice.[3]

However disturbing this state of affairs may have been to men like Smith, it was, after all, not different from that which prevailed in England.[4] In the circumstances no other conditions were possible in America at that time. Perhaps there was unspoken apprehension that the colonies' rapidly growing population needed more doctors than could meet objective requirements, that, balancing out the risks, ill-trained physicians were better than none at all.

Throughout the colonial period, to be sure, in most of the large towns there were always one or two physicians who had spent some time in a European medical school. Cadwalader Colden, who practiced in Philadelphia for ten years early in the eighteenth century before going to New York, was an Edinburgh graduate. At Newport in 1744 Dr. Alexander Hamilton, another Edinburgh graduate, was entertained by Dr. Moffatt, a graduate of Edinburgh, and by Dr. John Brett, who had been at Leyden. In Boston Dr. William Douglass never let his hearers forget that he had studied at Leyden and Utrecht and in a published dissertation had once sneered at the great Boerhaave as merely a devourer of books.[5] When they were at all properly trained, these European physicians gave their patients medical care at least as good as that received by the citizens of English provincial towns, and infinitely superior to that to which most of the London poor were exposed.

But being bred at Leyden or Edinburgh was no guarantee of professional competence. Some men, with no more than a single short winter's course in Holland, assumed a medical degree on crossing the ocean. Moreover, the graduate of Edinburgh might find he was the only properly qualified physician in the American town where he settled, the only physician of any kind for miles around if he chose the country. Without the benefit of professional conversation and professional criticism, his

[3] William Smith, *The History of the Province of New-York . . . to the Year M.DCC.XXXII* (London, 1757), p. 212.

[4] Bernice Hamilton, "The Medical Professions in the Eighteenth Century," *Economic History Review*, 2nd ser., 1951, *4*: 141-169.

[5] Carl Bridenbaugh, ed., *Gentleman's Progress: The Itinerarium of Dr. Alexander Hamilton, 1744* (Chapel Hill, 1948), pp. 102, 116-117, 137-138, 156-158.

ideas and practice tended to become rigid, even to deteriorate. Thus one Virginia physician, trained under the apprenticeship system, wrote sarcastically of

> those selfswolen sons of pedantic absurdity, fresh & raw from that universal asylum of medical perfection, Edinburgh, . . . [who] enter with obstinate assurance upon the old round of obsolete prescription, which their infallible masters taught them, &, like the mule that turns aside for no man, push on in their bloody career till the surrounding mortality, but more especially the danger of their own thick skulls, brings them to a pause, & works in them a new conviction.[6]

Whether good or bad, Europe-trained physicians, however, were always a minority in the colonies. Only one of Boston's ten practitioners in 1720 had a foreign degree, and J. M. Toner found that only one in nine Virginia physicians of the eighteenth century had attended a medical school.[7] A grammar school or academy, then apprenticeship to an older doctor (who was himself likely to have learned medicine as an apprentice) formed the usual pattern. To be sure, an observant lad, with intelligence and good sense, could acquire a good deal of medical knowledge from an experienced and conscientious master, and become a successful practitioner. But apprentices were not always observant or masters experienced. "A young man without any liberal education," wrote Dr. Douglass in his history of the British settlements in America,

> by living a year or two in any quality with a practitioner of any sort, apothecary, cancer doctor, cutter for the stone, bone-setters, tooth-drawer, &c. with the essential fundamentals of ignorance and impudence, is esteemed to qualify himself for all the branches of the medical art, as much or more than gentlemen in Europe well born, liberally educated (and therefore modest likewise) [who] have travelled much, attended medical professors of many denominations, frequented city hospitals, and camp infirmaries, &c. for many years.

The system was not all bad, of course—practical observation and experience was worth something—but it could be, and often was, as Douglass said, "an impudent delusion and fraud."[8]

Next after the men trained as apprentices were the apothecaries, merchants who, called on to prescribe for their customers, might, and often did, teach themselves a good deal of medicine. Here the danger was not only ignorance, but avarice, for, as tradesmen, the apothecaries

[6] S. Griffin to Levi Bartlett, [April 4, 1794], Miller Collection, Richmond, Va., Academy of Medicine.

[7] J. M. Toner, *Contributions to the Annals of Medical Progress . . . in the United States* (Washington, 1874), p. 106.

[8] William Douglas, *A Summary, Historical and Political, of the . . . British Settlements in North-America*, 2 vols. (London, 1760), vol. 2, pp. 383, 384.

were interested in selling as many nostrums as possible. "How dismal is it to observe some apothecaries shops wainscotted or papered with advertisements, recommending quack medicines for the profit of the shop, but destruction of their neighbours?" exclaimed Douglass indignantly. "This is vending of poisons for gain."[9]

An interesting development occurred in the history of the apothecaries in eighteenth century America. Some of them in the second third of the century began to move out of the ranks of the merchants into those of the physicians. The elder William Shippen of Philadelphia, for example, advertised himself in the 1730's as a chemist and drug-seller at the Sign of Paracelsus' Head; in 1749, with two or three other apothecaries, he joined the regularly-trained physicians of the city in signing a public statement on behalf of the "practitioners in physick." He was "Doctor" Shippen thereafter.[10]

Still a third group (if that word may be used of so varied a lot) of practitioners provided for the medical needs of American colonials. This included persons who had abandoned weaving, or black-smithing, or almanac-making to practice medicine. "Discarded Surgeons of Ships," who, William Byrd wrote in 1706, "know nothing above very common Remedys," were in their number.[11] So were the midwives, and the women who were almost the only medical practitioners in Cape May County, New Jersey, until the opening of the nineteenth century.[12] One "doctor" of this sort, a rude fellow in a worsted cap, accosted Dr. Alexander Hamilton at Huntington, Connecticut. He had been a shoemaker, and a good one, Hamilton learned,

> but happening two years agoe to cure an old woman of a pestilent mortal disease, he thereby acquired the character of a physitian, was applied to from all quarters, and finding the practice of physick a more profitable business than cobling, he laid aside his awls and leather, got himself some gallipots, and . . . fell to cobling of human bodies.[13]

The aristocratic Dr. Hamilton liked to be amusing, yet there was no little truth in his pictures of indolent, dirty, even drunken physicians so-called. Unquestionably there were personal tragedies here: the men who were failures in Boston and Albany and in dozens of American

[9] *Ibid.*, p. 352.
[10] *Pennsylvania Gazette*, May 18, 1749.
[11] Quoted in John Duffy, *Epidemics in Colonial America* (Baton Rouge, 1953), p. 9.
[12] Stephen Wickes, *History of Medicine in New Jersey, and of its Medical Men . . . to A. D. 1800* (Newark, 1879), p. 16.
[13] Bridenbaugh, *Gentleman's Progress*, p. 91.

villages had probably crossed the Atlantic because they had failed somehow at home. But beyond this, affecting even the well-trained and well-intentioned, was the simple fact that in colonial America the practice of medicine would not support a man outside the larger towns, and hardly there unless he also kept a shop for the sale of drugs. William Douglass assured Cadwalader Colden that he lived "handsomely" on the income from his practice and managed to save something as well;[14] but the commoner experience was, as one observer wrote, that Galens had but thin soup here.[15] Young Adam Cunningham, after two years' practice of sorts in Virginia, concluded in 1730 that there was

> no way of making money in this country so easy as by merchandizing, this being the occupation they all [i. e., all the doctors] come at, for after they have purchas'd a little Stock by their Practice, they presently commence Merchants, and so make their Fortune. So that if Doctor Blair, Colonel McKenzie, and many others whom I could name have made their Fortunes in this Country, it is not to be attributed to their practice in Phisick but to Traffick.[16]

The paradox—that the people called for more medical care while the physicians complained they could not make a living—is only a seeming one. The people's calls came chiefly from rural districts, where the rapidly expanding population was constantly moving beyond the physicians' reach. Ten-mile journeys to a sick-bed were commonplace; eighteenth-century fee bills provided for them.[17] Furthermore, the physicians who settled in the country, like most of those indeed who came to America from Europe, were likely to be men who had been unsuccessful or had poor prospects at home. As a result, medical care in the countryside was likely to be poor, if it was to be had at all. For their part the country practitioners seem to have made few complaints. They accepted the fact that a visit to a patient ten miles distant was a day's work for a good deal less than a day's income in town, and they cultivated their farms.

It was in the towns, rather, where they were surrounded by the sick, that physicians complained they could not live decently. This was in part, of course, because the sick are often also the poor. Adam Cunningham confessed he freely gave medicines to the poor, and "do my endeavour

[14] Douglass to Colden, February 20, 1720/1, *Colden Papers*, I (New-York Historical Society *Collections*, 1917), p. 114.

[15] Bridenbaugh, *Cities in the Wilderness*, p. 89.

[16] Cunningham to Sir William Cunningham, May 24, 1730, in Whitfield J. Bell, Jr., "Adam Cunningham's Atlantic Crossing, 1728," *Maryland Historical Magazine*, L (1955), p. 202.

[17] Wickes, *op. cit.*, pp. 70-71.

to make it up with the richer sort, but these gentlemen," he added wryly, "are so very careful not to fall sick, as I almost despair of making any thing of them." [18]

But a more important reason why urban physicians were ill-rewarded was that there were too many of them. The towns swarmed with physicians and persons who called themselves physicians. There were more than 40 doctors in New York in 1750, when the total population of that city was considerably under 15,000. Cunningham said 25 or 30 physicians lived in Williamsburg and its environs in 1730—a time when the population of James City County was probably only 3700, including negro slaves.[19] Small wonder that only two doctors there were able to live well.

To this simple arithmetical fact another may be added to explain why physicians were scarce in the country and not wealthy in the towns: they were in competition with laymen and even their own patients. The low esteem in which medical "science" and medical practitioners were generally held until late in the century, the distance at which many lived from any doctor, promoted a good deal of self-reliance and self-medication among the laity. The younger John Winthrop prescribed for all kinds of patients and diseases, from drunken Indians to the Governor's lady; and he extracted and compounded prescriptions in his own laboratory. Colonel Daniel Parke of Virginia, merchant, planter, public official, practiced medicine and was not above suing his non-paying patients in York County court. The eighteenth century was the last period when an educated layman could expect to know something about medicine. Private gentlemen bought and annotated medical texts, sometimes even attended medical lectures. The smallest collections of books in Tidewater Virginia early in the century were likely to contain Nicholas Culpeper's *English Physician.*[20] After 1735 John Tennent's *Every Man his Own Doctor* and similar manuals had good sale and wide use throughout the colonies. Thus, because physicians in the country were

[18] Cunningham to Sir William Cunningham, May 24, 1730, in Bell, "Adam Cunningham's Atlantic Crossing, 1728," *loc. cit.*, p. 202.

[19] Evarts B. Greene and Virginia D. Harrington, *American Population before the Federal Census of 1790* (New York, 1932), pp. 100, 151; Adam Cunningham to Sir William Cunningham, August 2, 1729, in Bell, "Adam Cunningham's Atlantic Crossing, 1728," *loc. cit.*, p. 201; Smith, *op. cit.*, p. 212n.

[20] Samuel E. Morison, *Builders of the Bay Colony* (Boston, 1930), pp. 284-287; same, *The Intellectual Life of Colonial New England* (New York, 1956), pp. 136-140, 144; Louis B. Wright, *The First Gentlemen of Virginia: Intellectual Qualities of the Early Colonial Ruling Class* (San Marino, 1940), pp. 122, 128, 137, 140, 147-149, 204-205, 227-228, 241-243, 278-279; Blanton, *Medicine in Virginia in the Seventeenth Century* (Richmond, 1930), p. 281.

few, poor, and distant, private citizens physicked, bled, and sweated themselves, their families, and their slaves; and because private citizens thus performed their physicians' functions, trained medical men faced another discouragement from settling in the country.

Those who did so, despite all these objections, were apt to practice part-time, supplementing their income and increasing their prestige as merchants, planters, or lawyers. In seventeenth century Virginia, for example, several physicians, like Thomas Culmer of Surrey County, George Davis of Rappahannock, and Robert Ellyson of York, had practiced law as well as medicine.[21] In the eighteenth century the physician-planter and clergyman-physician patterns were common. Theodorick Bland, for example, a medical graduate of Edinburgh, soon joined careers as a soldier and a planter to his original profession; and his friend St. George Tucker sent him a light-hearted letter-in-verse that opened:

> Dear Doctor, Colonel, Farmer Bland,
> Your kind epistle came to hand. . . .[22]

Sometimes, in a curious reversal that reveals still more the disesteem in which medicine was held, it was medicine that was taken on as the additional vocation, the off-hours money-maker. Clergymen were particularly attracted to this practice. The Reverend Mr. Jacob Green of Hanover, New Jersey, asked his congregation's permission to practice medicine to augment his income. The congregation, frankly confessing that "country congregations could not have ministers unless ministers would . . . help support their own families," consented that "Mr. Green practice Physick if he can bair it."[23] Presumably he bore it very well, and soon had a share in a grist mill and a distillery. Sometimes these clergymen-doctors discovered, as did the Reverend Mr. Henry Lucas of the Society for the Propagation of the Gospel, that their knowledge of physic gave them "a great Opportunity of conversing with Men by wch. I have done that, wch. by preaching I could not have done."[24] All the same there were risks in the "angelic conjunction," at least to the church. The rector of Trinity Church in Newark, who added the healing of bodies to the cure of souls and was a member of the Medical Society of New Jersey, sent bills for professional services to his patients, many of

[21] Blanton, *ibid.*, pp. 266, 268.

[22] Tucker to Bland, 1780, quoted in Bangs Brothers, *Catalogue* [of L. J. Cist sale], October 5-8, 1886, p. 139.

[23] Wickes, *op. cit.*, pp. 267, 330, 348.

[24] Quoted in Duffy, *op. cit.*, p. 10.

whom were also his parishioners. This action, some of the latter were wont to think, was an unchristian one, contrasting unfavorably with the conduct of Jesus, who had healed the sick gratis.[25]

Such conditions of medical practice were hard enough for a competent physician to bear. What was galling beyond all patience was that quacks and medical mountebanks should meet with success, sometimes with greater rewards than trained physicians ever received. "There are some Qualities," disgustedly wrote Thomas Tudor Tucker, an Edinburgh graduate, as he quit the profession after several years' practice at Charleston, "which conduce more than a knowledge of the Profession, to advance a Man in the Practice of Physic. With these, an Apothecary's Apprentice with no extraordinary Talents will often succeed better than one who has more Advantage of Education."[26] Others, too, thought impudence and good fortune too highly paid. Not a few of the ablest practitioners, when the Revolution and the new state and federal governments offered fresh opportunities for civil and military careers, gratefully embraced those opportunities and quit their practices forever.

These conditions began slowly to change during the second third of the eighteenth century. After 1765 the dominant conditions of medical practice in America were wholly different. The revolution in medical science and medical training, the growing sense of professional feeling, with the consequent struggle to achieve status, which marked the history of the profession in England before mid-century, now found expression in the colonies. Knowledge was more exact and more expertly applied. Hospitals were opened, medical schools founded. Though the ill-trained and untrained survived, of course, their presumption was challenged with increasing success by physicians with a high ideal of their calling; they were revealed for what they were. One evidence of the stability and respect which the profession in America was achieving after mid-century was that sons were following their fathers into medicine. By 1770 there were several medical families—the Elmers, Blachlys, and Budds in New Jersey, the Shippens in Philadelphia, John Bard and his son Samuel in New York.

The new hospitals were both an evidence of these improvements and a means by which the revolutions in medicine were brought to the provinces. In character and purpose, even in organization and nomenclature, the hospitals at Philadelphia and New York, opened in 1752 and 1767 respectively, followed the pattern of provincial British hospitals at Edin-

[25] Wickes, *op. cit.*, pp. 167-168.
[26] Blanton, *Medicine in Virginia in the Eighteenth Century*, p. 29.

burgh, Exeter, Liverpool. Appointments on the medical staffs went generally to the most able and public-spirited physicians. So great were the opportunities they afforded for observation, practice, and teaching that the posts were soon coveted. If the doctors thus gave the hospitals professional approval, the hospitals on their part conferred a prestige on the regular physicians which no quack could hope to achieve.

Soon after the middle of the century native-born Americans began to go abroad to study medicine. This they were encouraged to do by some of the older physicians, both European and native-born, like Thomas and Phineas Bond, who had been to Leyden or Edinburgh, and by British army surgeons whom they met, and with whom some, like John Morgan, served, in the French and Indian War.

Their European experience was decisive for the American students. Though a few elected to remain in England, for most Europe was the point from which they saw their country whole and clear. In the dark oyster cellars of the Cowgate, Edinburgh, or some glorious afternoon when they strolled out to the Pentland Hills, as they walked the wards at St. Thomas's or breakfasted with wise old Dr. John Fothergill, the students compared medicine in America with medicine in Edinburgh and London, saw what it lacked and needed, and came to their resolution to reform profession and practice when they returned. With their teachers and one another they worked out their plans.

First, they would practice only according to what they called the regular mode of Great Britain, that is, practice medicine only, requiring a fee for their attendance and advice. They would thus exact of themselves and the American colonies that standard required of licentiates and fellows of the Royal Colleges of Physicians of London and Edinburgh. The constitution of the Virginians' anatomical club at Edinburgh in 1761, for example, an organization that provided practical experience through dissections of animal bodies and was a kind of fraternity as well, actually required of members and even of visitors to its demonstrations that they bind themselves, when they returned home, to practice medicine only. sell no drugs and perform no surgery.[27] Such resolutions were easier to make in Edinburgh than to keep in America. Ancient customs were hard to change; even William Douglass, though he kept no shop for the sale of drugs, allowed his patients to pay him as they preferred, some giving him an annual fee, sick or well.[28] What most patients saw was that if

[27] *Ibid.*, p. 91.

[28] "I have here practice amongst four sorts of People. Some familys pay me 5£ an. each for advice sick or well; some few fee me as in Britain, but for the Native New

they summoned their old doctor they got his advice and medicines for one fee, but that if they called in one of these high-toned young men fresh from Edinburgh, they must pay him one fee for advice and the apothecary another for medicines. Yet, one asks, had the people been more receptive to the new idea of practice, where else but from the physician was a patient in most parts of America to get his medicines in 1770? The regulations of the London and Edinburgh Colleges, to which the Americans referred so often, had realistically exempted from their requirement those physicians who lived more than seven miles from the metropolis.[29]

More immediately successful than this effort to separate the physician from the surgeon and apothecary was another improvement in medicine. This was the establishment of institutions for professional instruction. Wherever American students congregated in London and Edinburgh in 1760-67, their conversation was filled with plans and projects. That Shippen, Morgan, and Arthur Lee would establish a medical school at Philadelphia was common knowledge even before the two latter had graduated; and younger men like Samuel Bard and Thomas Ruston were in agonies that they would receive their degrees just a year or two too late to have a share in the glorious work.[30] As it fell out, medical classes opened in the college of Philadelphia in 1765; three years later—"the birthday of medical honours in America," the Provost proudly termed it—ten young men were graduated bachelors of medicine.[31] This was a greater number of Americans than graduated in any single year at Edinburgh. The opening of the Philadelphia school was followed two years later by the establishment of one at New York; and after the Revolution a medical school was projected at the College of William and Mary, and another was opened at Harvard. These medical centers would soon send forth streams of graduates, who, communicating with one

Englanders I am oblidged to keep a day book of my Consultations, advice & Visits and bring them in a Bill. Others of the poorer Sort I advise and Visit without any expectation of fees." Douglass to Colden, February 20, 1720/1, *Colden Papers*, I (New-York Historical Society *Collections*, 1917), pp. 114-115.

[29] John Morgan, *A Discourse upon the Institution of Medical Schools in America* (Philadelphia, 1765; facsimile reprint, Baltimore, 1937); *Historical Sketch and Laws of the Royal College of Physicians of Edinburgh from its Institution to 1925* (Edinburgh, 1925), pp. 114-115.

[30] Samuel Bard to John Bard, December 29, 1762, February 4, 1764, Bard Collection, New York Academy of Medicine; Thomas Ruston to Job Ruston, September 30, 1764, Ruston Papers, Library of Congress; David Van Royen to Arthur Lee, June 1, 1765, Arthur Lee Papers, University of Virginia Library.

[31] Joseph Carson, *A History of the Medical Department of the University of Pennsylvania* . . . (Philadelphia, 1869), p. 69.

another through private correspondence and medical journals and societies, would constitute the profession in America.

As he looked about on his fellow Americans at Edinburgh, considering their hopes and plans, Theodorick Bland assured his father in 1761 that the day was almost at hand when there would be enough properly qualified physicians to supply Virginia's needs "and in some measure to extirpate those numerous troops of impostors who daily pour in upon us, and who, I am told, profess what from their education they must be entirely ignorant of, or but meanly qualified for. . . ."[82] From the Virginians at Edinburgh, accordingly, in 1761 there came a memorial to the Virginia Council and House of Burgesses praying the enactment of such laws as would remedy the existing evils and "prevent any one for the future from professedly practicing medicine who has not received a public testimony of his abilities, being properly licensed and honored with a doctor's degree." When the Assembly took no action, Arthur Lee (who had led the Americans against the Edinburgh faculty when the latter awarded a medical degree to a man by examination alone) offered another proposal. "I was just now thinking," he wrote with elaborate casualness to his brother Richard Henry Lee in 1765,

> that irregular practice for the future might be prevented by a very simple method; that is, by making an Act, that for the future every man that settles in the Colony as a Physician, shall, previous to his practice, present his Diploma to the Speaker, or to the Assembly, and receive from them a Certificate, to be registered in the County Court, where he is to practice. That all persons undertaking to order medicine to sick people, without being so qualified shall subject themselves to a prosecution and penalty.[83]

A year after Arthur Lee made this suggestion in Virginia, John Morgan in Philadelphia proposed a scheme at once more grandiose and less practical. Forming a medical society composed only of men who had received formal university training, he then sought a charter from the Proprietors of Pennsylvania. By such incorporation he hoped to transform the medical society into an American college of physicians, a national body whose license and fellowship should be recognized throughout the colonies, driving out the unqualified. That a New England physician would submit to a Philadelphia board, that a sick man in New Hampshire or even in Pittsburgh would first determine whether his doctor had been

[82] Charles Campbell, ed., *The Bland Papers*, 2 vols. (Petersburg, Va., 1840-1843), vol. 1, pp. 18-19.

[83] Arthur Lee to Richard Henry Lee, March 20, 1765, "Early Letters of Arthur Lee," *Southern Literary Messenger*, 1859, *29*: pp. 71-72.

licensed by the Philadelphians, was not reasonable to expect. On advice from Pennsylvania politicians and London physicians, Thomas Penn declined to charter the medical society.[84] It remained merely a professional discussion group and in a year or two was absorbed into the American Philosophical Society.

The Medical Society of New Jersey, on the contrary, formed in the same year as Morgan's society, if less ambitious, was more realistic, and so achieved more for the reform of medicine. Its members bound themselves "to discourage and discountenance all quacks, mountebanks, imposters or other ignorant pretenders to medicine," and not to associate professionally with any except those who had been "regularly initiated into medicine," either at a university or under the direction of an able master, or otherwise.[85] What the New Jersey people looked forward to was a gradual improvement of the profession. That they would succeed in their aim was indicated a few years later, when the legislature, at the Society's request, in 1772 enacted a law requiring that henceforth physicians should be licensed to practice by the courts, after examination by a board of medical men.[86]

The bases of lasting improvements in medicine were the hospitals, the courses of lectures in the new schools, the steadily increasing fund of knowledge which it required training to understand and apply. The inhabitants of Northampton County, suffering from ague, small pox and dysentery, victims of "ignorant empiricks," could not have been expected to appreciate all this. The effects of the reforms were felt among them only long after they were made at Philadelphia, just as they had been applied at Philadelphia long after they were first practiced in England. The Pennsylvania farmers could not know, when they sent their petition to the Assembly in March, 1775, that in some respects medical practice in America was coming to maturity. Nor were they, perhaps, on that date, aware that this was also true of the British political communities in North America.

[84] William Smith to Thomas Penn, March 14, 1767, *Pennsylvania Magazine of History and Biography*, 1907, *31*: pp. 453-454; John Fothergill to [Thomas Penn], February 4, 1768 (copy), College of Physicians of Philadelphia; Thomas Penn to John Morgan, February 18, 1768, Penn Letter Books, IX, p. 226, Historical Society of Pennsylvania.

[85] Wickes, *op. cit.*, pp. 44-48.

[86] *Ibid.*, pp. 102-105.

EPIDEMICS, REAL AND IMAGINARY, AND OTHER FACTORS INFLUENCING SEVENTEENTH CENTURY VIRGINIA'S POPULATION *

WYNDHAM B. BLANTON

I

Of 105 persons who landed at Jamestown, May 13, 1607, more than one-half died the first summer. Year after year additional immigrants came in spite of the high mortality that awaited them. Five hundred and twenty-five died in the first three years. In the first decade-and-a-half, 1607-1624, although 7,549 persons had entered the colony, at the end of that period only 1,095 remained.[1] The death of 6,454 persons in so short a time abundantly justifies the historian's habit of designating this loss as "The Great Mortality."

Two contemporary writers testified to the plight of the settlers. George Percy said that "For the most part they died of meere famine. Our food was but a small Can of Barley sod in water to five men a day. Our drinke cold water taken out of the River; which was at floud verie salt; at low tide full of slime and filth."[2] Writing in 1624 Captain John Smith records that of the 500 settlers he left at Jamestown, only 60 were alive six months later, those that survived subsisting on "roots, herbes, acornes, walnuts, berries, now and then a little fish."[3] William Stith, writing in 1749 about conditions at Jamestown in the winter of 1609-10 states that "so extreme was the famine and disease at that time that it was for many years after distinguished and remembered by the name of 'the starving time.'"

In the few surviving contemporary descriptions of conditions at Jamestown no clear and satisfying clinical picture of disease appears. The term "anatomies" must refer to those who were emaciated by starvation. Vaguer terms such as "scorbutical dropsies," and "cruel diseases with

* Presented at the thirtieth annual meeting of the American Association of the History of Medicine: "Symposium on Colonial Medicine," sponsored jointly with the Medical College of Virginia Foundation, Richmond, Va., May 7, 1957.

[1] Alexander Brown, *The First Republic in America* (Boston and New York, 1898), pp. 285, 329, 612.

[2] *Narratives of Early Virginia, 1607-1625.* Ed. L. G. Tyler (New York, 1907), pp. 21, 22.

[3] John Smith, *The Travels of Captain John Smith* (Glasgow, 1907), p. 204.

swellings,"[4] take on meaning when we consider "the common kettle" and its meager allowance of half-a-pint of wheat and half-a-pint of barley per man per day. The suspicion is strong that here we are dealing with accounts of deficiency diseases, if not in pure form, certainly as mixed manifestations of an unbalanced, low-calory, low-vitamin diet.

Beri beri, described first by Jacobus Bontius in 1642, is, of course, not mentioned by name, but scurvy is referred to by name on a number of occasions; and one governor, Lord Delaware, a sufferer from it, sailed for the West Indies in search of a cure by a fresh diet, especially oranges and lemons.[5] To these mixed deficiency diseases should be added, Professor E. V. McCollum suggests, the toxic effect of spoiled grain, and the likelihood of nutritional hypo-proteinemia.[6]

Because diarrhea during starvation does not necessarily imply epidemic dysentery, allowance has to be made in assessing the importance of the "bloody flux," or dysentery, often mentioned as a cause of death during this early period. But as the century wore on, dysentery and the burning fevers of the summertime, no doubt typhoid fever, did become probably the most serious health hazards of the colony. Percy regarded them as largely contributive to the mortality of 1607-08, and reference is repeatedly made in later years to "bloody flux" and "calenture"—fever—in what was called the "seasoning" of newcomers. The House of Burgesses adjourned in 1619 probably on account of an outbreak in Jamestown of one of these communicable intestinal diseases.[7] In explanation Purchas wrote that in 1610 the water supply of Jamestown came under suspicion. "A well six or seven [feet] deep, fed by the brackish river oozing into it" was believed by him to be the cause of "many diseases and sicknesses which have happened to our people who are indeed strangely afflicted with fluxes."[8]

Picture several hundred persons confined to a triangular fort, 100 by 100 by 140 yards, whose only water supply was the river that flowed by or a shallow well in the middle of their crude, encircling, mud and wood shacks. Here are all the factors of crowding and pollution necessary for the development of water-borne intestinal infections. The colonists, somewhat naturally, but of course erroneously, attributed their afflictions to

[4] George Percy, "Observations," in *Narratives of Early Virginia*, p. 21.

[5] Alexander Brown, *The Genesis of the U. S.* (Boston and New York, 1890), vol. 1, pp. 479, 480.

[6] E. V. McCollum, Personal communication.

[7] Proceedings of the First General Assembly of Virginia. Printed in *Colonial Records of Virginia.*

[8] Samuel Purchas, *Pilgrimes* (London, 1625), vol. 4, p. 1753.

the excessive heat of summer, to the hard labor to which they were unaccustomed, and to the necessity of eating "pork fresh and unseasoned for want of salt."[9] To remedy the salt deficiency the salt works, abandoned for a time, were directed set up again. A belated town ordinance forbade the pouring of slops into the streets or "within twenty foote of the olde well, or new pumpe." Nor should anyone "within lesse than a quarter of one mile from the Pallizadoes, dare to do the necessities of nature, since by these unmanly, slothful, and loathsome immodesties, the whole fort may be choked and poisoned with ill aires, and so corrupt (as in all reason cannot but much infect the same). . . ."[10] Finally, in 1611, Sir Thomas Dale ordered the abandonment of the well.

II

Jamestown, the scene of such heavy mortality in the early years of the colony, became less and less important as the century wore on. Though for a hundred years it remained the capital, it was in fact just a port of entry with a small population.[11] With time the settlers fanned out to occupy scattered plantations extending by the end of the century to the falls of the rivers. The houses of the period were for the most part small, one or two rooms, often with dirt floor. Large families and many indentured servants made crowding unavoidable. It is understandable, therefore, that newcomers, subjected to such conditions in the summertime, should have had febrile diseases of a contagious, serious nature. And yet, since there were no towns in Virginia, since the roads were poor, and travel difficult, there was relative freedom from some of the epidemics that afflicted the other colonies, particularly those of New England.

Historians of seventeenth century Virginia have maintained not only that malaria was prevalent in the colony, but that it was a large factor in the great mortality of the early years. This was the opinion of Brown[12] and Stanard,[13] and Wertenbaker goes on record as saying that "swarms of mosquitoes arose from the stagnant pools of water to attack the immigrants with a sting more deadly than that of the Indian arrows."[14]

A re-appraisal of the situation leads us to doubt the significance of

[9] Brown, *First Republic*, p. 327.

[10] Peter Force, *Tracts and Other Papers* (Washington, 1836-1846), vol. 3, p. 15.

[11] S. H. Yonge, *The Site of Old "James Towne" 1607-1698* (Richmond, 1907), pp. 43, 44, 45.

[12] Brown, *First Republic*, p. 381.

[13] M. N. Stanard, *Story of Virginia's First Century* (Philadelphia, 1928), p. 43.

[14] T. J. Wertenbaker, *Virginia Under the Stuarts, 1607-1688* (Princeton, 1914), p. 11.

malaria in Virginia's first century, and to rule it out entirely as one of the causes of the great mortality of the first years of the Jamestown settlement.[15]

In considering the epidemiology of malaria one has to take into account two factors—man and the mosquito. Did malaria exist among the Virginia Indians prior to the English settlement at Jamestown? The best authorities say "no." P. M. Ashburn,[16] Henry Carter[17] and Louis Williams[18] say "no," basing their opinion upon the belief that *anopheles*, the malaria-bearing mosquito, did not flourish in the dense forests and shaded swamps of primeval Virginia, and upon the fact that uncontrolled malaria notoriously destroys happiness, intelligence and vigor, replacing them with anemia and debility. There is no evidence to prove that the Powhatan Indians were anything but a reasonably happy, intelligent, and vigorous race.

The plasmodium of malaria in the blood of chronic carriers, it is believed, was brought into Virginia first from Europe, and later from Africa. It was the opinion of Ashburn that the real introduction of malaria into the Americas came with the slaves from the heavily infested west coast of Africa relatively late. There were no slaves in Virginia before 1620; few before the middle of the century; and only 6,000 by 1700.

It is generally recognized that chronic carriers do not represent a great danger to a community in the absence of a high concentration of malaria-bearing mosquitoes. Of course we know that there were mosquitoes in Virginia to welcome the first settlers at Jamestown. Beverley wrote in 1705 that "Musketaes are a sort of Vermin, of less danger but much more troublesome because more frequent."[19] Hugh Jones, writing a generation later, in explaining why Jamestown was deserted in favor of Williamsburg as a capital, was of the opinion that the latter was "a healthier and more convenient place and freer from the annoyance of musketoes."[20]

Williams, however, points out that "the James River at Jamestown is tidal, and I feel sure," he writes, "that an 'annoying abundance' of

[15] This position was questioned as late as 1953, Duffy stating that "it has been claimed that Virginia was relatively free of malaria in the 17th Century, but in view of its widespread distribution this assertion seems doubtful." John Duffy, *Epidemics of Colonial America* (Louisiana State University Press, 1953), p. 207.

[16] P. M. Ashburn, *Ranks of Death* (New York, 1947), pp. 107, 112, 120.

[17] Henry Carter, *Yellow Fever* (Baltimore, 1931), pp. 49, 74, 75, 156, 157.

[18] Personal communication.

[19] Robert Beverley, *The History and Present State of Virginia* (University of North Carolina Press, 1947), p. 302.

[20] Hugh Jones, *The Present State of Virginia* (University of North Carolina Press, 1956), p. 25.

mosquitoes could only have been from heavy breeding either of *aedes vexans* in rain pools or flood waters, or from *aedes sollicitans* breeding in salt marshes. Neither of these mosquitoes transmits malaria." Referring to the brackish water of the marshes surrounding Jamestown he continues: "The type of marsh which this, and the surrounding terrain, indicate was never, in my experience in Virginia, a breeding area responsible for more than a very few malaria-carrying mosquitoes. As a matter of fact I know of only one natural breeding area in Virginia which produced our malaria vector in such density as to be described as an 'annoying abundance.' I find myself unable," he concludes, "to visualize any condition in the early Jamestown days which could have caused any great abundance of *anopheles quadrimaculatus*." [20a]

Malaria in America was a man-made disease. Its appearance in epidemic proportions awaited not only carriers from Europe and the more numerous and dangerous carriers from Africa. It came about through the clearing of the forests and the impounding of water for mill ponds and other uses as the population grew and spread. For thus was developed the habitat ecologically necessary to the breeding of the *anopheles* mosquito, —namely: a modicum of sunshine, still and stagnant water, and flotage of leaves and twigs on the surface, with associated aquatic growth.

Consideration should also be given to the fact that in contemporary writing, and in descriptions of diseases of the colony, there appears no convincing clinical description of malaria as a widespread or fatal malady. There are but six references before 1700 which I have been able to find which mention "ague"—the current word for chills and fevers, and Ashburn showed that in two of these cases, those of Martin and Lord Delaware, the infection of malaria could not have originated in Virginia. Had malaria been much of a problem, its wracking chills and soaring temperatures in recurring episodes would certainly have found frequent and dramatic expression.

At the time of the Jamestown settlement, plague was prevalent and deadly in England. The disease undoubtedly occurred among passengers on ships bound for Virginia and many no doubt died of it. Gabriel Archer in 1609, for example, refers specifically to the disease on the *Vice-Admiral*, and he tells us that four other vessels had from 60 to 90 passengers thrown overboard because of it.[21] One of the earliest Jamestown health ordinances forbade the throwing of soapy water into the open street because in London it had been observed that "not only soap boilers and venders of it, but all washerwomen and all they whose business it was

[20a] Personal communication.

[21] Brown, *First Republic*, p. 97.

to use soap . . . died of the plague." [33] In spite of such current fears we have only two dubious references to the disease. These come from Northampton County, where it was recorded that "John Stringer, chirurgeon, has given his attendance upon Rich. Newport, Gent." and also upon one Edward Newport, both of whom died of a "contagious disease called the plague." [34]

K. F. Meyer has commented upon these facts and conclusions, pointing out that "human cases could not have served as sources of infection because they were buried at sea." Moreover, he says, "in all probability commensal rats had not been fully established in the new colony; [the time of] their exact arrival is not known. But even if they were present the conditions were probably not suitable for the maintenance of the plague infection." [35]

There is no contemporary record of yellow fever in seventeenth century Virginia, although Brown [36] considered it a likely cause of the Jamestown mortality of 1609. The disease has a brief incubation period and is vector-borne. The offending mosquito, *aedes aegypti,* is of African origin, and yellow fever is a disease known to have been brought to this country almost exclusively from the west coast of Africa, where it was endemic, or from the West Indies, where it had been brought from the same source. Like malaria it came with the accelerated slave trade of later years. Its spread depended upon the presence of the *aedes aegypti* mosquito which did not survive our winters but was re-introduced probably from the West Indies, each spring. Fred L. Soper believes that "the summer temperatures would permit the *aegypti* to breed freely in water barrels and other water containers around the docks and set up the conditions suitable for the spread of yellow fever when this disease was brought in later in the season by ships also coming from the West Indies. For this series of conditions to occur it would be necessary to have settled colonies with active ports having considerable trade with the West Indies. These conditions almost surely did not exist during the early decades of the Virginia colony." [37]

Place should be reserved in this discussion for several other epidemic diseases—the winter epidemics for example. There are records of at least three. In 1623 Butler tells us that "people are forced by a continual

[33] *Ibid.*, p. 131.
[34] Northampton County Records, vol. 1640-45, pp. 218-219.
[35] Personal communication.
[36] Brown, *Genesis of U. S.*, p. 329.
[37] Personal communication.

wading and wetting of themselves and it in ye prime of winter when ye ships commonly arrive, and thereby get such violent surfeit of cold upon cold as seldom leave them until they leave to live."[27] In 1635 De Vries records a winter epidemic with a heavy mortality, and in 1688 the House of Burgesses adjourned because "the winter distemper was so very fatal," declaring "a fast for ye great mortality."[28] These were undoubtedly respiratory diseases, but whether they were pneumonia, pleurisy, or influenza is uncertain. What is certain is that to contemporary observers they were terrifying and fatal.

Smallpox and measles, often confused, were both epidemic in Virginia in the latter half of the seventeenth century. Smallpox in England at this time was one of the common diseases of childhood. Practically all of the adults who first settled this country were immune. The introduction of a single case, however, among non-immune Indians frequently wiped out the whole tribe. Thus Jefferson tells us that the Indian population in 1669 was "in the space of 62 years reduced to ⅓ their former numbers."[29] Lack of immunity to the white man's, and especially to the black man's, diseases played a major part in the red man's destruction.

The immunity enjoyed by the early settlers was not conveyed to their children, so that with the passing of the years and with the importation of more and more active cases, smallpox, especially among the slaves, became increasingly prevalent and deadly. In 1667 a sailor introduced smallpox into Accomac County. The resulting outbreak affected the nearby Indian tribes and spread over the Eastern Shore with a fearful mortality.[30] In 1696 smallpox became so prevalent at Jamestown that the Assembly took another of those recesses it resorted to in times of such emergency.[31]

Measles is recorded only once as epidemic in the colony. That was in the year 1693. A day of humiliation and prayer was declared, "it having pleased almighty God to afflict this colony with the measles whereof several have died."[32]

Strangely enough two other diseases carrying a high mortality often epidemic in other colonies do not appear in seventeenth century Virginia.

[27] E. D. Neill, *Virginia Company of London* (Washington, 1868), pp. 395-401.
[28] Ludwell Papers in the *Virginia Magazine of History and Biography*, vol. 5, p. 61.
[29] Thomas Jefferson, *Notes on State of Virginia.*
[30] J. C. Wise, *Ye Kingdome of Accawmacke; or, The Eastern Shore of Virginia in the Seventeenth Century* (Richmond, Va., 1911), p. 63; P. A. Bruce, *Institutional History of Virginia in the Seventeenth Century* (New York, 1910), vol. 2, p. 18.
[31] Bruce, *op. cit.*, vol. 2, p. 488.
[32] Executive Journals, Council of Colonial Virginia, vol. 1, pp. 285-292.

For example, scarlet fever and diphtheria are found nowhere either by name or clinical description in the records of the century in Virginia.

III

The growth of Virginia's population in the seventeenth century was checkered and slow, especially toward the end of that period. Alarmed over the situation Francis Nicholson, and later Edward Randolph, were commissioned by the Board of Trade to investigate and to report the reasons for it.[83] The explanations arrived at were economic. In their report, reference was not made to epidemic diseases, to high mortality, or to a biological factor which in our estimation was of great importance.

Favoring the growth of the colony there were a number of factors. For a hundred years there had been a steady influx of settlers averaging close to a thousand persons a year. They were mostly of the child-bearing age, averaging about twenty-six years.[84] They came into a land of plenty where, except for the earliest Jamestown period, there was no hunger. They lived to an average age of fifty-one years and five months.[85] Under theoretically normal conditions such favorable factors as these should have produced in Virginia by 1707 a population close to 130,000 persons.[86] The fact that the actual population was much less than this—probably less than 70,000,[87] not half the expected figure—can only be explained as the result of a number of opposing unfavorable factors.

Epidemic diseases were important in the first few years. Massacres, wars and accidents probably accounted for from 1-2,000 deaths.[88] Dissatisfied persons returning to England perhaps did not exceed 5,000 persons.[89] Internal migration, due at first to economic pressure incident to the low price of tobacco after the Restoration, and later to the increased influx of slave labor, accounted for an indeterminate number of dis-

[83] T. J. Wertenbaker, *The Planters of Colonial Virginia* (Princeton University Press, 1922), p. 140, quotes *Calendar of State Papers*, Colonial Series, 1696-1697, p. 420.

[84] *Calendar of State Papers*, pp. 42-43.

[85] Based on study of 205 seventeenth-century families.

[86] Assuming a birth rate of 40 and a death rate of 35 per 1,000 persons for 100 years, the natural increase of the population would be 0.5 per cent year. Using this figure and applying the principle of compound interest to each annual cohort of 1,000 persons, and adding together the survivors of all these cohorts and their descendants, we arrive at the figure of 130,000. This calculation was made for us by Professor William S. Cochran, Department of Biostatistics, Johns Hopkins University.

[87] E. B. Green and V. D. Harrison, *American Population Before Census* 1790.

[88] W. B. Blanton, *Medicine in Virginia in the Seventeenth Century* (Richmond, 1930), p. 42.

[89] 154 (5 per cent) of first 3,000 returned. Cf. Brown, *First Republic*, p. 612.

gruntled settlers moving westward and into the adjoining colonies of North Carolina, Maryland, Pennsylvania and the Jerseys.[40] Since the population of North Carolina in 1689 was only 3,000, the loss in this direction cannot have been large.[41] And by the same token those families who moved to other neighboring colonies were probably fewer than has been suggested. In spite of a multiparous motherhood, a high infant mortality reduced the Virginia family to a size smaller than has usually been assumed. In an analysis of 100 typical Virginia families in this century, only 3.5 children per family were found. One-half of the infants born at this time are said to have died before their first birthday. But all of these unfavorable factors still do not account for the discrepancy between the actual and the expected population.

The most important factor contributing to the disappointing growth in population was, in our opinion, the scarcity of women. In the first century of the colony, there were surprisingly few women in Virginia, a ratio to men of only one in five. Out of 93,234 persons counted during a prolonged search of the patent books and other records of the times, only 17,350 women were discovered.[42] Calculations of the expected population at the end of the century, when based upon this factor—the scarcity of women—other favorable and unfavorable factors having been given their due weight, approach very closely to the actual figures recorded by contemporary authorities.[43]

[40] Wertenbaker, *Planters of Colonial Virginia*, p. 140 ff.

[41] H. T. Lefler, *History of North Carolina* (New York, 1956), vol 1, p. 58.

[42] Virginia Land Patents. Register of Land Office. Virginia State Library. Vols. I-X.

[43] Assuming that at an average rate of 1,000 annually 100,000 persons entered the Virginia Colony before 1707 and that only 20 per cent were women (actual count), it follows that 40,000 (40 per cent) were married and by 1707 had multiplied to 52,000. Assuming that the average age of entry was 26 years and that the average person lived 25 years in the Colony and that at an average entry rate of 1,000 per year, there would be 24,000 original immigrants in the Colony in 1707, of which 15,000 (60 per cent) were unmarried men. The addition of 52,000 to the 15,000 equals 67,000. This is the expected population in 1707.

AN EXHIBITION ON THE HISTORY OF CARDIOVASCULAR SOUND INCLUDING THE EVOLUTION OF THE STETHOSCOPE

VICTOR A. McKUSICK, WILLIAM D. SHARPE, AND ALLEN O. WARNER

This exhibit was displayed during 1957 in the Institute of the History of Medicine, The Johns Hopkins University, in commemoration of the tercentenary of the death of William Harvey (1587-1657), who made the first clear reference to the existence of the normal heart sounds.

Obviously it was necessary, for reasons of space, to be selective in preparing the exhibit. In the main the exhibit consisted (1) of publications which are landmarks in the history of cardiovascular sound and (2) of portraits of outsanding contributors. The publications here listed under each name were displayed. An asterisk (*) by the name of the contributor indicates that his portrait was included in the exhibit. In a few instances where portraits were not readily available, the source has been specifically indicated. The six sources listed at the end were useful references.

General Outline

I Pre-Laennec Descriptions of Cardiovascular Sound.
II Structure and Function of the Heart Valves in Health and Disease.
III Laennec.
IV The Stethoscope.
V The Golden Century of Stethoscopy (1819-1919).
VI Eponyms in Cardiovascular Sound.
VII The Physics and Physiology of Cardiovascular Sound.
VIII Phonocardiography.
IX Selected Monographs.
X The Lighter Side.

I. Pre-Laennec Descriptions of Cardiovascular Sound (Including Early References to Direct Auscultation)

1. Hippocrates (c. 400 B. C.) succussion splash of hydropneumothorax by direct auscultation. *De morbis*: 2, 47.
Littré, E.: *Oeuvres complètes d'Hippocrate*, Vol. 7. Paris: J. B. Baillière, 1851. P. 70.

2. Caelius Aurelianus (c. 200 A. D.); direct auscultation in bronchitis. *De morbis chronicis*: 2, 14.

   Drabkin, I. E.: Caelius Aurelianus' *On Acute Diseases and On Chronic Diseases*. Chicago: Univ. of Chicago Press, 1950. P. 695.

3. William Harvey* (1578-1657), England—first clear description of heart sounds.

   Leake, Chauncey O.: William Harvey's *Exercitatio anatomica de motu cordis et sanguinis in animalibus*. Springfield, Ill.: Charles C. Thomas, 1928. (Frontispiece gives famous reference to heart sounds in "visceral lectures" of 1616. Compared heart to "two clacks of a water-bellows to rayse water.")

   Harvey, William: *Exercitatio anatomica de motu cordis et sanguinis in animalibus*. Frankfort: William Fitzer, 1628. P. 30: ". . . with each movement of the heart, when there is the delivery of a quantity of blood from the veins to the arteries, a pulse takes place and can be heard within the chest."

4. Robert Hooke (1653-1703), London—described heart sounds and predicted diagnostic usefulness.

   The Posthumous Works of Robert Hooke. London: Richard Waller, 1705 (Fig. 1). P. 39: "I have been able to hear very plainly the beating of a Man's Heart. . . . Who knows, I say, but that it may be possible to discover the Motions of the Internal Parts of Bodies. . . . by the sound they make, that one may discover the Works performed in the several Offices and Shops of a Man's Body, and thereby discover what Instrument or Engine is out of order."

5. Cornelius Stalpert vander Wiel (1620- ?)—loud pericardial friction rub.

   Observationum rariorum medic. anatomic. chirurgicarum Cent. 1, obs. 36. 1687, quoted by Morgagni, J. B.: *The Seats and Causes of Diseases*. Translated from the Latin by Benj. Alexander, M. D., Vol. 1. London, 1769. P. 394: "For he tells us of a girl being cur'd by him, who had her face pallid and very much swell'd, and had never undergone any menstrual purgations, in whom he could very distinctly hear the agitation of the water itself in the perdicardium, when the heart was pulsating (for she labour'd under a palpitation of the heart)."

6. James Douglas (1676-1742), St. Bartholomew's Hosp., London—murmur in aortic regurgitation (audible at a distance).

   An extraordinary dilatation or enlargement of the left ventricle of the heart. *Phil. Trans. Roy. Soc.* (London) *6*: 181, 1713-1723: "And which is almost incredible, sometimes the trembling and throbbing made such a noise in his breast, as plainly could be heard at some distance from his Bed-side."

7. William Hunter* (1718-1783), London—direct auscultation of murmur of arteriovenous fistula.

   Further observations upon a particular species of aneurysm. *Medical Observations and Inquiries 2*: 390-414, 1764. P. 403: Compared the murmur (*bruisse-*

The Posthumous

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OF

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By *RICHARD WALLER*, R. S. Secr.

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FIG. 1. Title-page of the posthumous publication containing Hooke's reference to the heart sounds.

ment) to that produced by air in passing through a small opening, or to the sound of the letter R spoken in a prolonged whisper.

8. Anthelme Balthasar Richerand (1779-1840), Paris—murmur of arteriovenous fistula.

   Aneurisms. Panckoucke's *Dictionaire Abrégé des Sci. Méd. 1*: 433, 1821: "The ear, applied to the bend of the elbow, heard a faint murmur, produced by the friction of the blood against the margins of the opening between the vein and the artery."

9. Joseph Hodgson (1788-1869), Birmingham—murmur of femoral arteriovenous fistula, produced by sword wound. Audible at distance of 3 or 4 inches.

   Treatise on the Diseases of Arteries and Veins containing the Pathology and Treatment of Aneurisms and Wounded Arteries. London: Thomas Underwood, 1815.

10. Dominique-Jean Larrey* (1766-1842), Paris—murmur of A-V fistula.

    Mémoires de chirurgie militaire, Vol. 4. Paris: J. Smith, 1817. P. 343: "The clavicle was obscured by a considerable tumor which had a pulsation synchronous with the pulse. Furthermore, one felt and heard more deeply and in the direction of the axillary vein, a singular murmur (*bruissement*), like that which would be produced by a liquid which was made to pass through many crooked, metallic pipes."

11. Allan Burns (1781-1813), Glasgow—murmur of mitral regurgitation audible at a distance.

    Observations on Some of the Most Frequent and Important Diseases of the Heart. Edinburgh: Thomas Bryce & Co., 1809. P. 187: Described a "hissing noise, as of several currents meeting; the sound was frequently audible, as in the varicose aneurism. . . . On dissection, the mitral valve was found indurated, and reticulated. . . . There seemed to be an opening left between the auricle and ventricle, during the contraction of the latter. Thus on each contraction, the blood flowed in part into the aorta, in part into the left auricle, producing regurgitation along the pulmonary veins. . . . The regurgitation of the blood from the ventricle into the auricle, must have produced . . . the hissing. . . ."

    Portrait: Silhouette, courtesy of the Library of the University of Glasgow. (Fig. 2.)

12. Leopold Auenbrugger (1722-1800), Vienna—by description of percussion prepared the way for other methods of physical diagnosis.

    Inventum novum. Vienna: Johannes Thomas Trattner, 1761.

13. Jean-Nicolas Corvisart* (1755-1821), Paris—as translator of Auenbrugger and teacher of Laennec also laid the ground for stethoscopy; direct auscultation of murmur of mitral valve disease.

    Nouvelle méthode . . . par Auenbrugger. Ouvrage traduit . . . par J. N. Corvisart. Paris: Migneret, 1808.

    Les maladies et les lesions organiques du coeur. Paris: Migneret, 1806. P. 236.

14. Gaspard-Laurent Bayle (1774-1816), phthisiologist, Paris. Introduced Laennec to direct auscultation. "Bayle was the first whom I saw employ it when we followed the service of Corvisart together. The professor never put his head to the chest." Laennec, *Auscultation médiate*. Second edition, 1826. Vol. 1, p. 5.

FIG. 2. Silhouette,
Allan Burns.
Courtesy of the Library,
University of Glasgow.

15. François Isaac Mayor (1779-1854), surgeon, Geneva—described fetal heart sounds and usefulness in diagnosis of pregnancy, including twin pregnancy (1818).

Bibliothèque universelle des sciences et arts 9: 248, 1818: "M. Mayor believes he has discovered something of importance to the art of obstetrics, namely, a means of determining whether the infant is dead or alive in the mother's womb; if the infant is alive but the pelvis contracted, caesarian operation is performed. M. Mayor has demonstrated that when one places the ear to the abdomen of the women, the beatings of the heart of the infant are heard."

II. STRUCTURE AND FUNCTION OF THE HEART VALVES IN HEALTH AND DISEASE

1. Erasistratus (c. 250 B. C.)—described heart valves naming atrioventricular valves *tricuspid* and arterial valves *sigmoid* (early Greek sigma shaped like our letter C). Original lost; Quoted by Galen: Kühn edition, vol. 5, Leipzig: Cnobloch, 1823, p. 548-9. See p. 206 for Galen's own description.

2. Andreas Vesalius * (1514-1564), Brussels—compared left atrioventricular valve to bishop's mitre ("mitral valve").

De humani corporis fabrica libri septem. Basel: Oporinus, 1543. VI, xiii,

p. 592: ". . . authorities on dissection agree that only two little membranes [cusps] are provided for its orifice, which you may compare not inappropriately to a bishop's mitre."

3. Julius Caesar Arantius (1530-1589), Bologna—described fibrocartilaginous node in semilunar valves (" corpus arantii ").

   De humano foetu. Venice: Jacob Brechtan, 1587.

4. Antonio Maria Valsalva (1666-1723), Italy—described bulbous dilatations at base of aorta and pulmonary artery, significant in connection with arterial valve function.

   Opera. 2 vol. Venice, 1740.

5. Leonardo da Vinci (1452-1519)—functional anatomy of the heart valves.

   O'Malley, Charles D. and J. B. de C. M. Saunders: *Leonardo da Vinci on the Human Body.* New York: Henry Schuman, 1952.

6. L. R. Longworth, Cincinnati—conclusions similar to Leonardo's on one aspect of functional anatomy of heart valves.

   Why are the segments of the semilunar valves three in number? *Clinic 14*: 73, 1878.

7. Milton Kissin (1904-), New York—practical confirmation of Leonardo's concept that three cusps are optimum.

   Pulmonary insufficiency with a supernumerary cusp in the pulmonary valve. *Am. Heart J. 12*: 206, 1936.

8. Yandell Henderson * (1873-1944), New Haven—physiology of valve closure.

   Henderson, Johnson: Two modes of closure of the heart valves. *Heart 4*: 69, 1912-1913.

9. John Mayow (1643-1670), Oxford—described mitral stenosis. *Mayow's Medico-Physical Works.* Edinburgh, 1707. Pp. 795-7. (Reprint of second edition of *Tractatus quinque*, 1669.)

10. William Cowper (1666-1709)—calcific aortic stenosis.

    Of ossifications or petrifactions in the coats of arteries, particularly in the valves of the great artery. *Phil. Trans. Roy. Soc. 5*: 215, 1703-1712.

11. Giovanni Lancisi (1654-1720)—calcific stenosis.

    Wright, Wilmer Cave: *Lancisi's De aneurysmatibus.* New York: The Macmillan Co., 1952.

III. Laennec

1. Réné Théophile Hyacinth Laennec * (1781-1826), Breton in Paris—invented mediate auscultation and the stethoscope.

   De l'auscultation médiate ou traité du diagnostic des maladies des poumons et du coeur. Paris: J.-A. Brosson and J.-S. Chaudé, 1819.

2. John Forbes* (1787-1861)—translated Laennec's work into English. *A Treatise on the Diseases of the Chest.* Philadelphia: James Webster, 1823. (First American edition of Laennec.)

3. First Italian edition.
Modigliani, Angiolo (translator): *Trattato della ascoltazione mediata.* Livorno: Antonelli Bertani, 1833.

IV. The Stethoscope

1. Leonardo da Vinci (1452-1519)—suggested what was in essence the stethoscope for use in another connection.
MacCurdy, Edward: *The Notebooks of Leonardo da Vinci.* New York: Reynal & Hitchcock, 1938. Vol. 1, p. 277: "If you cause your ship to stop, and place one end of an oar in the water and the other end to your ear, you will hear ships at a great distance from you. You can also do the same by placing the end on the ground, and you will then hear anyone passing at a distance from you."

2. Pierre-Adolphe Piorry* (1794-1879)—"slenderized" the monaural stethoscope, introduced trumpet chest-piece, improved ear-piece for better seal.
De la percussion médiate et des signes obtenus à l'aide de ce nouveau moyen d'exploration dans les maladies des organes thoraciques et abdominaux. Paris: Chaudé et Baillière, 1828.

3. George P. Cammann (1804-1863), New York—invented binaural flexible stethoscope of essentially modern design (1855).
Self-adjusting stethoscope. *New York Medical Times 4*: 140, 1855.
Picture of Cammann stethoscope from p. 324 of S. S. Alison's *Physical Examination of the Chest.* London: John Churchill, 1861.

4. H. W. Syers—decried the use of the binaural stethoscope.
The decay of auscultation and the use of the binaural stethoscope. *Lancet 1*: 369, 1902.

5. Lewis A. Conner (1867-1950), New York—described limitations of the stethoscope, particularly in the detection of faint aortic diastolic murmurs; practiced direct auscultation.
On certain acoustic limitations of the stethoscope and their clinical importance. *Trans. Assoc. Am. Phys. 22*: 113, 1907.

6. Aurelio Bianchi—invented the phonendoscope (1894).
Baker, A. George (translator): Bianchi's *On the Phonendoscope and its Practical Application.* Philadelphia: George P. Pilling & Sons, 1898.
Photographs: The phonendoscope in use (from above publication).

7. William J. Kerr (1889-), San Francisco—described the "symballophone."
Kerr, William J., T. L. Althausen, A. M. Bassett, and M. J. Goldman: The

symballophone: a modified stethoscope for the lateralization and comparison of sounds. *Am. Heart J. 14*: 594, 1937.

8. Howard B. Sprague (1895-), Boston—invented chest piece combining bell and diaphragm.
   A new combined stethoscope. *J. A. M. A. 86*: 1909, 1926.

9. The evolution of the stethoscope. Shown in Figures 3 and 4 are some of the stethoscopes exhibited. The majority of them were exhibited through the courtesy of the Museum of the Armed Forces Institute of Pathology, Washington, D. C.

V. The Golden Century of Stethoscopy (1819-1919).

A. *General.*

1. Jean-Baptiste Bouillaud* (1797-1881), Paris—described and named gallop rhythm (*bruit de galop*); called venous hum *bruit de diable* (humming top) but thought it was generated in carotid arteries; pointed out group of conditions in which there are two closely timed sounds in the vicinity of the normal second sound (his *bruit de rappel*, a type of drum beat); etc. (Fig. 5)
   Traité clinique des maladies du coeur. Paris: J.-B. Baillière, 1835. Photograph of examples of his use (pp. 239-240) of musical notation to represent musical venous hums.

2. Isidore Bricheteau (1789-1862)—described and named *bruit de moulin* (water-wheel sound) in hydropneumopericardium.
   Observation d'hydro-pneumo-péricardie, accompagnée d'un bruit de fluctuation perceptible à l'oreille. *Arch. gén. méd. 64*: 334, 1844.

3. Richard C. Cabot* (1868-1939), Boston—described a functional diastolic murmur at the cardiac base with severe anemia; did frequency analyses of murmurs.
   (with Edwin A. Locke): On the occurrence of diastolic murmurs without lesions of the aortic or pulmonary valves. *Bull. Johns Hopkins Hosp. 14*: 115, 1903.

4. Charcelay of Tours—described presytolic gallop with Bright's disease.
   Mémoire sur plusieurs cas rémarquables de défaut de synchronisme des battements et des bruits des ventricules du coeur. *Arch. gén. méd. 68*: 393, 1838.

5. Dominic John Corrigan* (1802-1880), Dublin—described murmur and pulse change of aortic regurgitation.
   On the permanent patency of the mouth of the aorta, or inadequacy of the aortic valves. *Edinburgh M. S. J. 37*: 225, 1832.

6. John D. Fisher (1797-1850), Boston—described cephalic bellows sound.
   Observations on cerebral auscultation. *Am. J. Med. Sci. 22*: 277, 1838.

FIG. 3. Rigid monaural stethoscopes. Unless otherwise specified, exhibited and photographed through courtesy of Museum of the Armed Forces Institute of Pathology, Washington, D. C. 1. Replica of Laennec's "quire of paper . . . very tightly rolled" (1816). 2. Invented by C. J. B. Williams, London (1837). 3. Attributed to Sir William Ferguson (1808-1877), surgeon of Edinburgh (before 1863). 4. Combination stethoscope and percussion hammer said to have been invented by Solger (before 1872). 5. Attributed to Heinrich Quincke (1842-1922), Kiel (before 1868). 6. Metal stethoscope of Pinard (1876). 7. Combination stethoscope and percussion hammer presumably invented by Felix von Niemeyer (before 1868). 8. Student's stethoscope, Zurich (1936). Price 75c. 9. Metal stethoscope attributed to Ludwig Traube (before 1876). 10. Russian stethoscope captured in Korea (1950). 11. Replica of Laennec's wooden stethoscope (1819): From Dr. W. P. Boger, Sharp and Dohme, courtesy of Dr. Richard H. Shryock.

FIG. 4. Flexible stethoscopes, mostly binaural. Unless otherwise indicated, exhibited through courtesy of Museum of the Armed Forces Institute of Pathology, Washington, D. C. 1. Type used early as 1830. Chest piece at right end. 2. Invented by George P. Camman, New York (1855). 3. Kerr symballophone. Courtesy of Dr. Robert W. Garis, Baltimore. 4. Teaching stethoscope, double (before 1896). 5. Modern stethoscope with Sprague-Bowles combination chest-piece.

7. Samuel Jones Gee (1839-1911), London—great teacher.
   Auscultation and Percussion. London: Smith, Elder & Co., 1893.

8. Robert James Graves (1797-1853), Dublin—helped establish diagnostic value of pericardial friction sounds.
   A System of Clinical Medicine. Dublin: Fannin & Co., 1843.

9. Thomas Hodgkin * (1798-1866), Guy's Hosp. London—described murmurs of retroverted aortic cusp (sometimes called Hodgkin-Key murmur).
   On retroversion of the valves of the aorta. *London Med. Gaz. 3*: 433, 1828-1829.

10. James Hope * (1801-1841)—made many observations on clinical cardiovascular sound and did experiments in animals. (Fig. 5)
    A Treatise on the Diseases of the Heart and Great Vessels. London: John Churchill, 1839 (3rd edition).
    Photograph of Hope's drawing (in above publication) of his case of rupture of sinus of Valsalva into right ventricle. (Fig. 5)

11. Henri Huchard * (1844-1910), Paris. Many observations, e. g., musical murmurs of moderator band (aberrant tendon) of the ventricle.
    Contribution à l'étude clinique des tendons aberrants du coeur. *Rev. de méd. 13*: 113, 1893.

12. Jean-Alexandre Lejumeau de Kergaradec (1787-1877), Paris.
    Mémoire sur l'aucultation appliquée à l'étude de la grossesse, ou recherches sur deux nouveaux signes propres à faire reconnaitre plusieurs circonstances de l'état de gestation. *Journal de physiologie expérimentale et pathologique. 2*: 11a, 1822.

13. Peter Mere Latham * (1789-1875)—great teacher and medical axiomist.
    Lectures on Subjects Connected with Clinical Medicine Comprising Diseases of the Heart. Philadelphia: Ed. Barrington & Geo. D. Haswell, 1847.

14. Thomas Bevill Peacock * (1812-1882), London—important observations with clinical-pathological correlations in valvular and congenital heart disease. (Fig. 6)
    Valvular Diseases of the Heart. London: J. & A. Churchill Ltd., 1865.
    On Malformations, etc., of the Human Heart. London: J. Churchill, 1858.

15. Pierre-Carl Potain * (1825-1901), Paris—described many clinical phenomena of importance, e. g., the early diastolic sound of constrictive pericarditis, the presystolic gallop of hypertension, the early systolic click of dilated pulmonary artery or aorta, the systolic click of pleuropericardial adhesions, normal inspiratory splitting of second sound, etc. (Fig. 6)
    Du rhythme cardiaque appelé bruit de galop, de son mécanisme et de sa valeur séméiologique. *Bull. mém. Soc. méd. Hôp. Paris 12*: 137, 1875. (One of several publications.)

16. George Frederick Still (1868-1941)—described functional murmur known as "twanging string" murmur.
Common Disorders and Diseases of Childhood. London: Oxford University Press, 1909. P. 434.

17. William Sidney Thayer* (1864-1932), Baltimore—observations on the third heart sound. (Fig 6)
On the early diastolic heart sound (the so-called third heart sound). *Boston Med. & Surg. J. 158*: 713. 1908.

18. Charles J. B. Williams* (1805-1889), London—studied relations of heart sounds to valve movement by putting finger in auricular appendage; introduced famous onomatopoetic "lubb-dub."
Memoirs of Life and Work. London: Smith, Elder & Co., 1884.

B. *Mitral Stenosis.*

"Because of the multiplicity of its auscultatory signs, because of the unusual character of certain of these, and finally, because of its own frequency, mitral stenosis probably is the cardiopathy which has motivated the largest number of clinical and phonocardiographic studies." Calo, *Les bruits du coeur et des vaisseus.* Paris: Masson, 1950. P. 259.

1. R. J. Bertin (1767-1828), Paris—one of earliest descriptions of what in retrospect was almost certainly the diastolic rumble of mitral stenosis in association with atrial fibrillation.
Traité des maladies du coeur et des gros vaisseux. Paris: J. B. Baillière, 1824. Pp. 176-177.

2. Joseph Škoda (1805-1881), Vienna—weak aortic sounds and loud "P2" in mitral stenosis.
Abhandlung über Perkussion und Auskultation. Vienna: Braumüller & Siedel, 1842 (2nd edition).

3. Sulpice-Antoine Fauvel (1813-1884), Paris—described mitral stenosis and assigned term presystolic to murmur of mitral stenosis. (Fig. 5)
Mémoire sur les signes stéthoscopiques du rétrécissement de l'orifice auriculo-ventriculaire gauche du coeur. *Arch. gén. méd. 61*: 1, 1843.

4. A.-N. Gendrin (1796-1890), Paris—earliest use of the term presystolic. *Leçons sur les maladies du coeur et des grosses artères.* Paris: Germer Baillière, 1841-1842. P. 31.

5. [Sir] William Tennant Gairdner* (1824-1907), then in Edinburgh—described what he termed the "auricular systolic" murmur of mitral stenosis.
A short account of cardiac murmurs. *Edinburgh Med. J. 7*: 438, 1861.

FIG. 5.

Above: Bouillaud

Below: Fauvel

Above: Hope

Below: Hope's own drawing of his case of aneurysm of the aortic sinus of Valsalva ruptured into the right ventricle. From 1839 (3rd) edition of his *Diseases of the Heart*.

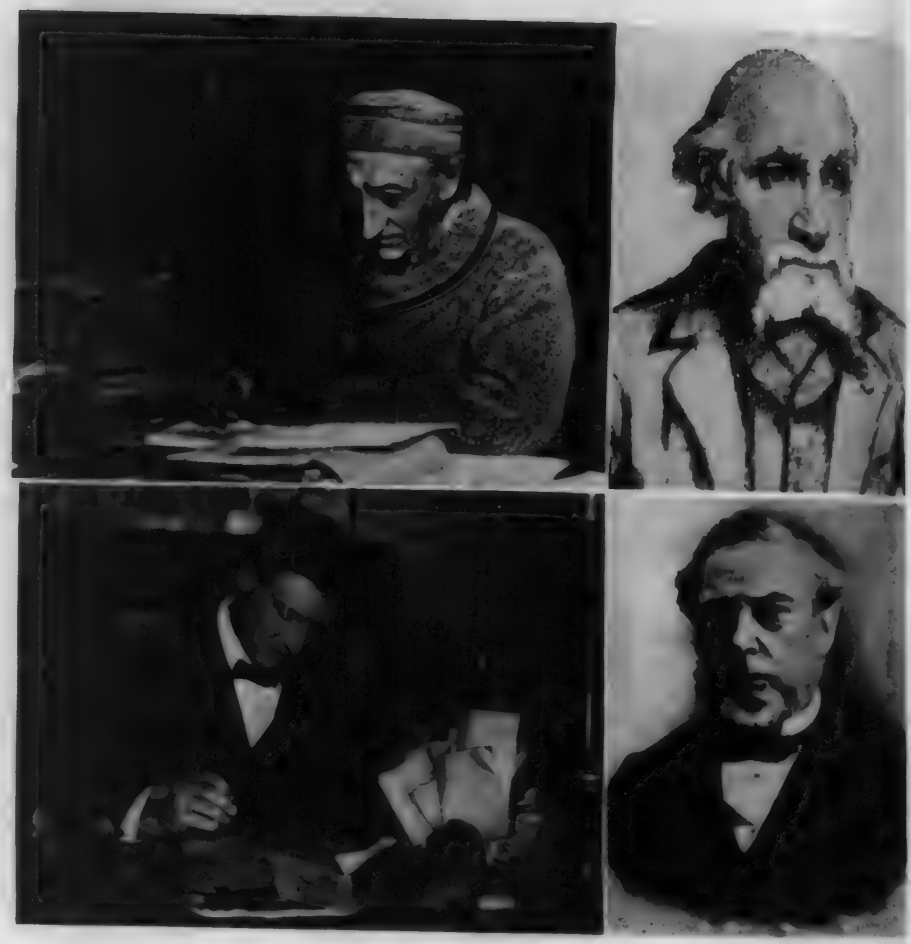

FIG. 6.

Above: Potain. From biography by Pierre Teissier. *Above*: Duroziez

Below: Thayer *Below*: Peacock

6. Paul-Louis Duroziez (1826-1897), Paris—the "fout-ta-ta-rou" of mitral stenosis. (Fig. 6)

   Essai sur les maladies du coeur. Du rhythme pathognomonique du rétrécissement mitral. *Arch. gén. méd. 110*: 385, 1862.

7. Paul Guttmann (1834-1893), Berlin—early description of mitral opening snap.
   A Handbook of Physical Diagnosis. Translated by Alexander Napier. London: The New Sydenham Society, 1879.

8. Arthur Ernest Sansom (1839-1907), the London Hospital—early description of mitral opening snap; noted murmur suggesting mitral regurgitation but actually due to pericardial roughening.

   The Treatment of Some of the Forms of Valvular Disease of the Heart. London: J. & A. Churchill, 1886.

   Manual of the Physical Diagnosis of Diseases of the Heart. Philadelphia: Presley Blakiston, 1881 (3rd edition).

9. Sir James MacKenzie* (1853-1925), Burnley and London—described disappearance of presystolic murmur of mitral stenosis with advent of atrial fibrillation; emphasized importance of myocardial damage over valvular disease (and murmurs). (Fig. 7)

   Diseases of the Heart. New York: Oxford University Press, 1910 (2nd edition).

10. R.-J.-M. Rouchès (1854- ?), Paris—gave detailed description of opening snap and gave it its name in M. D. thesis of 1888.

    Du claquement d'ouverture de la mitrale, étude clinique, séméiologique et pathogénique. Paris thesis, 1888.

VI. Eponyms in Cardiovascular Sound

1. Rufus I. Cole* (1872-) and Arthur Bond Cecil (1885-)—the Cole-Cecil murmur.

   The axillary diastolic murmur in aortic insufficiency. *Bull. Johns Hopkins Hosp. 19*: 353, 1908.

2. Carey Coombs* (1879-1932), Bristol, England—mitral diastolic murmur of acute rheumatic fever with carditis. (Fig. 7)

   Rheumatic Heart Disease. New York: Wm. Wood, 1924. P. 190.

3. Paul-Louis Duroziez (1826-1879), Paris—Duroziez's sign in aortic regurgitation.

   Du double souffle intermittent crural, comme signe de l'insuffisance aortique. *Arch. gén. méd. 107*: 417, 1861.

4. Wilhelm Herman Erb* (1840-1921)—presumably described Erb's area: third

left interspace at left coastal margin where diastolic murmur of aortic regurgitation is maximal.

Publication which led to eponym unknown.

5. Austin Flint* (1812-1886), America—described the Austin Flint murmur of aortic regurgitation simulating mitral stenosis. (Fig. 7)

   On cardiac murmurs. *Am. J. Med. Sci. 44*: 29, 1862.

6. Balthazar Foster (1840-1913)—described Foster's rule and the Balthazar Foster murmur, both probably meaningless (Kerr and Palmer, *New England J. Med. 248*: 1064, 1953).

   Clinical lecture on rupture of the aortic valves from accident. *Med. Times and Gaz. 2*: 657, 1873.

7. George A. Gibson* (1854-1913), professor of medicine, Edinburgh—described continuous machinery murmur of patent ductus arteriosus—"the Gibson murmur."

   Persistence of the arterial duct and its diagnosis. *Edinburgh Med. J. 8*: 1, 1900.

8. Nikolai Sergeyevich Korotkoff (1874- ?), St. Petersburg (now Leningrad), Russia—described arterial sounds used in estimating blood pressure—"Korotkoff sounds." Original communication reported only stenographically.

   See: Pickering, J. W., *High Blood Pressure*, New York: Grune and Stratton, 1955.

9. Jacob Lerman (1902-) and James H. Means (1885-), Massachusetts General Hosp., Boston—wrote about scratchy pulmonary systolic murmur in thyrotoxicosis simulating pericardial friction rub—"Lerman-Means scratch."

   Cardiovascular symptomatology in exophthalmic goitre. *Am. Heart J. 8*: 55, 1932.

10. Henri Roger* (1811-1891), Paris—described the murmurs of uncomplicated ventricular septal defect—"the Roger murmur" in "maladie de Roger." Also, with Barth, wrote popular text on auscultation.

    Recherches cliniques sur la communication congénitale des deux coeurs par inocclusion de septum interventriculaire. *Bull. Acad. Méd. Paris 8*: 1074, 1879.

11. Graham Steell* (1851-1942), Manchester, Eng. Pulmonary diastolic murmur of pulmonary hypertension. (Fig. 7)

    The murmur of high-pressure in the pulmonary artery. *Med. Chronicle 9*: 182, 1888.

12. Ludwig Traube* (1818-1876), Berlin—described Traube's sign, a double sound over peripheral arteries in aortic regurgitation. Also studied gallops.

    Ueber den Doppleton in der Cruralis bei Insufficienz der Aortenklappen. *Berliner klinische Wochenschrift 9*: 573, 1872.

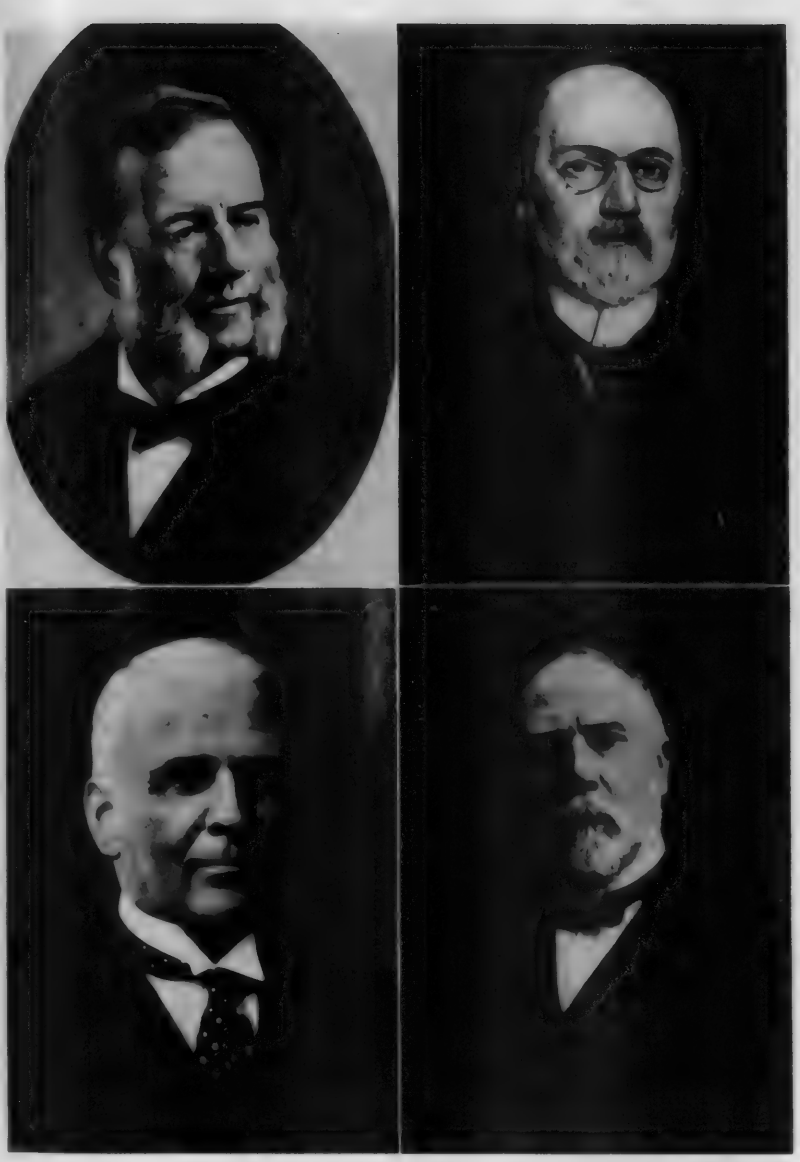

FIG. 7.

Above: Austin Flint

Above: James Mackenzie

Below: Graham Steell
Courtesy of Dr. A. Morgan Jones, Manchester

Below: Carey Coombs
Courtesy of Dr. John Cosh, Bristol.

VII. The Physiology and Physics of Cardiovascular Sound

A. *The Heart Sounds.*

1. John William Turner* (1790-1836), professor of surgery, Edinburgh—challenged Laennec's view that second sound due to atrial systole, by recalling old knowledge that atrium contracts just *before* ventricle.

   Observations on the causes of the sounds produced by the action of the heart. *Trans. Med.-Chir. Soc. Edinburgh 3*: 205, 1828.

2. Archibald Billing (? -1852), London—attributed both heart sounds to tensing of valves.

   On the auscultation and treatment of affections of the heart. *Lancet 2*: 198, 1832.

   Portrait (from *Med. Circ. 1*: 243, 1852).

3. J. Rouanet (1797-1865), Paris, later New Orleans—provided evidence in support of view that both the first and the second sound are the result of tensing of heart valves.

   Analyse des bruits du coeur. Paris thesis, 1832.

   Sketch (by Leon Schlossberg) of modern artist's conception of Rouanet's critical experiment relating second sound to tensing of arterial valves.

4. In 1830's the British Association for the Advancement of Science sponsored several studies of heart sounds and murmurs.

   Robert Adams, Robert Law, George Grieve, Ephraim M'Dowell, Bruce Joy, John Nolan, Erory Kennedy, and H. Carlile: Report of the motions and sounds of the heart. *Report of the Fifth Meeting of the British Association for the Advancement of Science.* London: John Murray, 1836.

5. Examples of erroneous theories of the heart sounds by distinguished physicians:

   a. François Magendie* (1783-1855), physiologist, Paris. Thought both sounds produced by impact of heart on chest wall—S 1 with systolic impact: S 2 with impact of diastolic filling.

   Mém. sur l'origine des bruits normaux du coeur. *Mém. de l'Acad. des Sci. 14*: 155, 1838 (paper read in 1834).

   b. Jean Cruveilhier* (1791-1874), pathologist, Paris—thought S 1 due to opening of arterial valves (flapping of cusps against vessel wall). He agreed with Rouanet that S 2 produced by closure of arterial valves.

   Note sur les mouvements et les bruits du coeur. *Gaz. méd. 9*: 497, 1841.

6. Auguste Chauveau* (1827-1917), veterinarian and physiologist, Lyon, later Paris.

   Rémarques sur le mécanisme des bruits de souffle vasculaires et sur le jeu des valvules auriculo-ventriculaires. *Journal de la physiologie de l'homme et des animaux 3*: 163, 1860.

Medal (1903): a. Profile. b. Laboratory scene showing cardiac catheterization of horse (c. 1860). Courtesy of Museum of Armed Forces Institute of Pathology.

Recording: Intraventricular pressure with time of heart sounds marked manually. From Marey, E. J.: *Circulation du sang à l'état physiologique et dans les maladies*, 1881.

7. Henri Chauveau, Paris—son of A. Chauveau, studied mechanism of gallops.

Étude cardiographique sur le mécanisme du bruit de galop. Paris thesis, 1902.

8. J. Gad—built early mechanical simulator of ventricular systole for studying valve function.

Klappenspiel in Ochsenherzen. *Arch. f. Physiol.* p. 380, 1886.
Sketch of set-up from above publication.

B. *Murmurs*

1. D. J. Corrigan * (1802-1880), Dublin—illustrated that murmurs arise beyond a constriction and that murmurs and thrills are basically identical.

Inquiry into the causes of "bruit de soufflet" and "fremissement cataire." *Lancet 2*: 1, 33; 1828-1829.

2. Félix Savart (1791-1841), Paris, physician-turned-physicist. Studied sound production when fluid flows through narrow orifices. Attributed sound to formation of "fluid veins" (i.e., vortices or eddies).

On some acoustic phenomena produced by the motion of liquids through short efflux tubes. *Phil. Mag. 7*: 186, 1854 (posthumous publication).

Photograph of bust (courtesy of *Académie des Sciences*, Paris).
Sketch of modern artist's conception of his experimental models.
Sketch of Savart's wheel for estimating frequency level (pitch).

3. Franz Kiwisch Ritter von Rotterau (1814-1852), gynecologist and obstetrician, Würzburg: Studied murmur-production in models similar to Corrigan's with similar conclusions.

Neue Forschungen über die Schallerzeugung in den Kreislauforganen. *Verhandlungen der Physikalisch-Medicinischen Gesellschaft in Würzburg 1*: 6, 1850.

4. Theodore Weber (1829-1899), Leipzig, later Halle, son of Ernst Heinrich Weber—by means of models like those of Corrigan and Kiwisch, demonstrated factors responsible for production of murmurs.

Physikalische und physiologische Experimente über die Entstehung der Geräusche in den Blutgefässen. *Arch. für physiologische Heilkunde 14*: 40, 1855.

5. Osborne Reynolds (1842-1912), engineer, Manchester, England—described the factors responsible for the development of turbulence in fluid flow; also described cavitation (bubble formation) as a cause of noise in flowing fluid.

An experimental investigation of the circumstances which determine whether the motion of water shall be direct or sinuous, and of the law of resistance in parallel channels. *Phil. Trans. Roy. Soc. 174*: 935, 1883.

Experiments showing the boiling of water in an open tube at ordinary temperatures. Paper 63 of *Scientific Papers* (Collected Works).

Portrait, courtesy of Prof. Robert Platt, U. of Manchester.
Sketch of Reynolds' experiment for study of flow patterns, from publication (1883) above.

Photograph of modern replica of Reynolds' cavitation experiment.

C. *General*

1. Hermann Vierordt (1853--1932), Tübingen, son of Karl von Vierordt— estimated intensity of cardiovascular sound by least number of segments which were necessary in a modified monaural wooden stethoscope to reduce the given sound to inaudibility.

   Die Messung der Intensität der Herztöne. Tübingen: H. Laupp, 1885.

VIII. Phonocardiography

A. *Oscillographic Phonocardiography*

1. K. Huerthle, Breslau—early records of heart sounds. (Fig. 8.)
   Ueber die Erklärung des Cardiogramms mit Hülfe der Herztonmarkirung und über eine Methode zur mechanischen Registrirung der Töne. *Deutsche medicinische Wochenschrift 19*: 77-81, 1893.

   Sketch of set-up using nerve-muscle preparation as galvanometer, from above publication.

2. Willem Einthoven* (1860-1927), Leyden—recorded heart sounds with Lippmann's capillary electrometer (1) and later with his own string galvanometer (2).
   (with M. A. J. Geluk): Die Registrirung der Herztöne. (Pflügers) *Archiv für die gesammte Physiologie des Menschen und der Thiere 57*: 617-639, 1894.
   Die Registrirung der menschlichen Herztöne mittels des Saitengalvanometers. (Pflügers) *Archiv für die Gesammte Physiologie des Menschen und der Thiere 117*: 461-472, 1907.

   Schema of Lippmann capillary electrometer (Fig. 9).

   Schema of Einthoven's string galvanometer phonocardiograph (after Rappaport and Sprague, *Am. Heart J. 21*: 257, 1941).

   Phonocardiograms made 1) with capillary electrometer (Fig. 9); 2) with Einthoven's original string galvanometer.

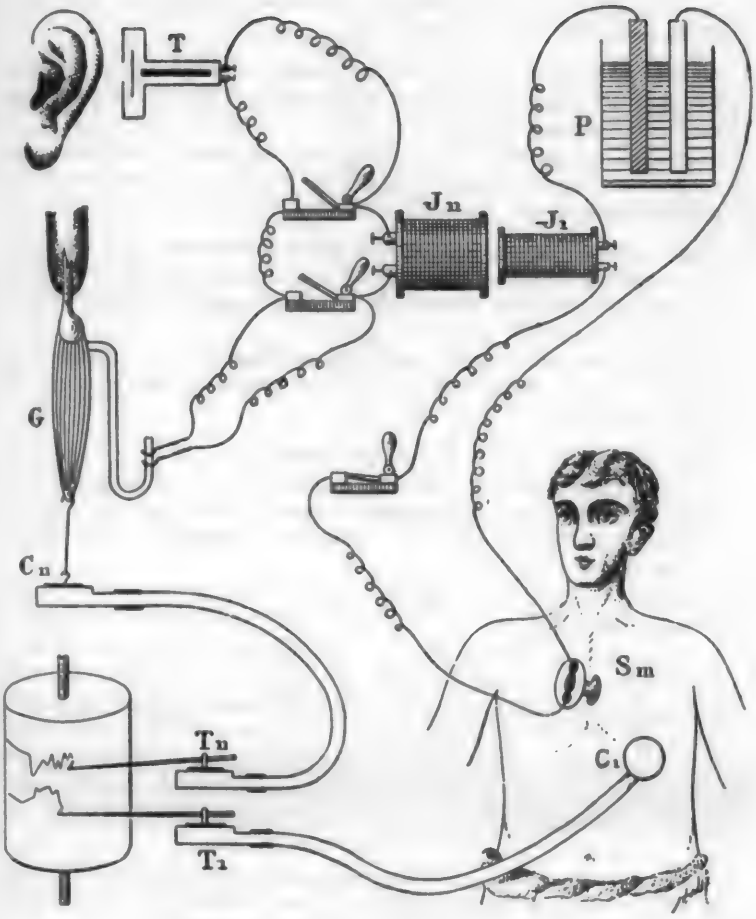

FIG. 8. Huerthle's apparatus using frog nerve-muscle preparation for registering heart sounds (1893).

3. Otto Frank* (1865-1944), Munich—direct recording method using the so-called Frank capsule.

   Die unmittelbare Registrierung der Herztöne. *Münchener medizinische Wochenschrift 51*: 953-954, 1904.

4. Maurice Rappaport and Howard B. Sprague (1895-), Boston—selected from among many contributors to development and use of electronic amplification in phonocardiography.

   Physiologic and physical laws which govern auscultation and their clinical application. The acoustic stethoscope and the electrical amplifying stethoscope and stethograph. *Am. Heart J. 21*: 257, 1941.

5. Edgar Mannheimer, contemporary pediatrician, Stockholm—appreciating fact that in quantifying cardiovascular sound frequency must be taken into account, he split sounds into fine overlapping frequency bands and estimated intensity of components in each.

   Calibrated phonocardiography and electrocardiography. A clinicostatistical study of normal children and children with congenital heart disease. *Acta paediat. 28* (suppl. II): 1-287, 1940.

6. Other outstanding students of phonocardiography.

   a. [Sir] Thomas Lewis* (1881-1945), London—using string galvanometer, confirmed disappearance of presystolic murmur of mitral stenosis with onset of atrial fibrillation; provided first recording of musical diastolic murmur of retroverted aortic cusp.

   Illustrations of heart sound records. *Quart. J. Med. 6*: 441, 1913. (One of several publications.)

   b. Charles C. Wolferth (1887-) and Alexander Margolies (1894-), Philadelphia. Studied mitral opening snap, introduced concept of summation gallop and gave name, pointed out relation of intensity of first sound to PR interval of EKG, on basis of phonocardiograms concluded that EKG pattern previously thought right bundle branch block really left bundle branch block.

   The opening snap ("claquement d'ouverture de la mitral") in mitral stenosis, its characteristics, mechanism of production and diagnostic importance. *Am. Heart J. 7*: 443, 1932. (One of several publications.)

   c. Camille Lian (1182-), Paris—pleuropericardial systolic clicks, early diastolic sound of constrictive pericarditis, early diastolic click of disease of aorta or pulmonary artery, musical extracardiac murmurs.

   (With J. J. Welti): Le claquement artériel pulmonaire protosystolique. *Arch. mal. coeur 30*: 946, 1937. (One of several publications.)

B. *Spectral phonocardiography.*

Differs from previous category in that frequency spectrum is displayed. Adaptation of method of sound spectrography ("Visible Speech") of Potter and associates of Bell Telephone Laboratories.

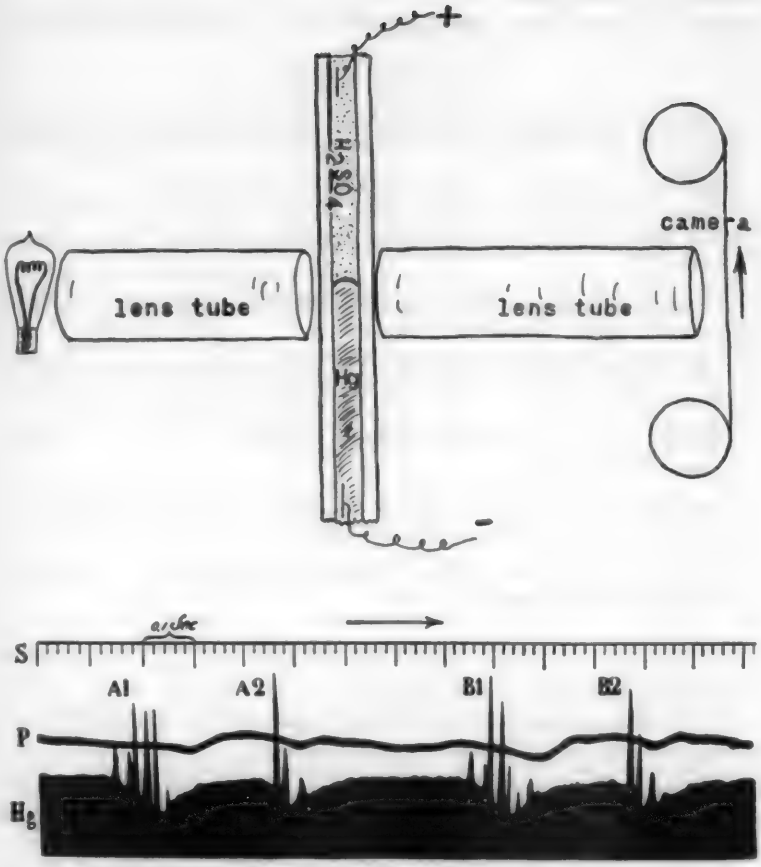

FIG. 9. *Above*: Schema of Lippmann capillary electrometer. Adapted from Fig. 202, p. 643, W. M. Bayliss: *Principles of General Physiology*. London: Longmans, Green, 1915.

Below: Phonocardiograms made with capillary electrometer. From Einthoven and Geluk (1894).

Potter, R. K., Kopp, G. A., and Green, H. C.: *Visible Speech.* New York: D. Van Nostrand Co., Inc., 1947.

Schemata of spectral phonocardiograph from *Bull. Johns Hopkins Hosp. 95*: 91, 1954.

IX. Selected Monographs

1. Orias, O. and Braun-Menendez, E. [From Buenos Aires.]: *The Heart-Sounds in Normal and Pathological Conditions.* London: Oxford University Press, 1939.

2. Lian, C., Minot, G., and Welti, J.-J. [From Paris.]: *Phonocardiographie. Auscultation collective.* (Acoustique-Technique-Clinique). Paris: Masson, 1941.

3. Weber, A. [From Bad Nauheim.]: *Herzschallregistrierung.* Dresden & Leipzig: Theodor Steinkopf, 1944.

4. Calo, A. [From Tunis.]: *Les bruits du coeur et des vaisseaux.* Paris: Masson, 1950.

5. Schmidt-Voigt, J.: *Herzschalldiagnostik in Klinik und Praxis.* Stuttgart: Georg Thieme, 1951.

6. Holldack, K. and Wolf, D. [From Heidelberg.]: *Atlas und kurzgefasstes Lehrbuch der Phonokardiographie.* Stuttgart: Georg Thieme, 1956.

7. Levine, S. A. and Harvey, W. P.: *Clinical Auscultation of the Heart.* Philadelphia: W. B. Saunders Co., 1949.

X. The Lighter Side

1. Oliver Wendell Holmes * (1809-1894).
   The stethoscope song (1848). A satirical poem about a young physician who took his newly acquired stethoscope too seriously.

2. Surprisingly enough, in France direct (immediate) auscultation was used to the exclusion of the stethoscope until about 1910 or later. Widespread adoption of the Korotkoff method for the determination of blood pressure led to a greater use of the binaural flexible stethoscope. But the use of direct auscultation made French physicians the butt of numerous cartoons of which four examples are included in the exhibit.

   a. Cover of *L'Assiette au Beurre* for March 22, 1902 (No. 51). Title of issue *Les médecins.* Artist: Abel Faivre.

   b. Reznicek: "Je pense que l'homme s'est endormi." From Weber, A.: *Tableau de la caricature médicale.* Paris, 1936.

   c. Caricature of physician using monaural stethoscope. Artist's signature not decipherable. Loaned by Dr. Moses Paulson, Baltimore.

   d. Caricature of direct auscultation. "L'ange gardien." Artist: Hoffmany (?). Loaned by Dr. Lawrence Freeman, New Haven.

3. Dr. Arthur Conan Doyle (1859-1930) has Sherlock Holmes identify the profession of a man by "a bulge on the side of his top-hat to show where he has secreted his stethoscope . . ." (*A Scandal in Bohemia*, Chapter I).

REFERENCES

1. Herrick, J. B.: *A Short History of Cardiology*. Springfield: C C Thomas, 1942.
2. Willius, F. A. and Key, T. E.: *Cardiac Classics*. St. Louis: C. V. Mosby, 1941.
3. Willius, F. A. and Dry, T. J.: *A History of the Heart and Circulation*. Philadelphia: W. B. Saunders, 1948.
4. Joseph, G.: Geschichte der Physiologie der Herztöne. *Janus, n. s. 2*: 1-39, 345-374, 505-527, 1853.
5. Rolleston, H. D.: The history of mitral stenosis. *Brit. Heart J. 3*: 1, 1941.
6. Rolleston, H. D.: *Cardiovascular Diseases since Harvey's Discovery*. Cambridge: University Press, 1928.

MEDICO-HISTORICAL NEWS AND ACTIVITIES

ANNOUNCEMENTS

NATIONAL NEWS

Kansas

The University of Kansas School of Medicine celebrated on Friday, September 13, 1957, the dedication of the Medical Library and Library of the History of Medicine. By action of the Board of Regents, the new Library building has been named the Clendening Memorial Library. The speaker at the dedication was Dr. Frank B. Rogers, Director of the National Library of Medicine. The title of his address was "Books and History." On the same day, the second Clendening Lecture (Eighth Series) was given by Dr. Ralph H. Major, titled "Logan Clendening." The first Clendening Lecture was given in Lawrence on September 12 with the title, "Disease and Destiny."

Dr. L. R. C. Agnew has assumed his duties as associate professor of medicine at the University of Kansas School of Medicine and chairman of the department of the history of medicine.

Los Angeles

The following series of monthly seminars on Surgical History will be held by the Department of Surgery at the Cedars of Lebanon Hospital, Los Angeles, Calif.: "Study of Early American Surgery," Marcus H. Rabwin; "Study of Billroth, Kocher, and their Disciples," Ludwig Strauss; "Study of First Senior Staff of Hopkins Medical School," I. Y. Olch; "Study of History of Hernia Repair," David Rosenblum; "Study of History of Gastrointestinal Surgery," Max Bay; "Study of History of Thoracic Surgery," Alfred Goldman; "Study of History of Hemostasis and Vascular Surgery," T. B. Massell.

Publications on wound treatment requested

Dr. Carlo Castellani, Via Monte Grappa, 10, Romano Lombardo (Bergamo), Italy, is interested "in publications on 'wound treatment in the centuries' and would be glad to get extracts, resumés and bibliography on the subject."

Jakob Erdheim

Dr. S. N. Rabson, 7475 Hillside Ave., Los Angeles 46, Calif., points out that the Viennese pathologist Erdheim who died in 1938 was Jakob Erdheim, not Moses Erdheim as mentioned in the review of *Blakiston's New Gould Medical Dictionary* published in the *Bulletin*, pp. 188-190.

PROGRAMS OF MEETINGS

Benjamin Waterhouse Medical History Society

October 28, 1957: "John Hughlings Jackson (1835-1911), His Personality and Neurological Stature," Arthur M. Lassek.

Society of Medical History of Chicago

October 9, 1957: "Concepts of Psychic Functions—East and West," Ilza Veith; "Franklin D. Roosevelt, the Common Cold and American History," Noah D. Fabricant.

NEWS FROM ABROAD

Anglo-American Symposium

"The History and Philosophy of Knowledge of the Brain and its Functions" was the subject of a symposium organized in connection with the First International Congress of Neurological Sciences (Brussels, July 1957) and sponsored by The Wellcome Historical Medical Library with the co-operation of the National Hospital, Queen Square, and the Maudsley Hospital. The symposium which took place in London, July 15-17, 1957, had been organized by a committee in London (Dr. Macdonald Critchley, Chairman), with the advice and co-operation of a special executive sub-committee (Dr. Horace W. Magoun, Chairman) appointed by the Congress National Committee for the United States. American and British exhibits had been arranged, and the program listed the following lecturers: David H. M. Woollam (Cambridge), J. S. Wilkie (London), Ilza Veith (Chicago), Macdonald Critchley (London), Denis Williams (London), Sir Russell Brain (London), Walter Pagel (London), Walther Riese (Richmond, Va.), W. P. D. Wightman (Aberdeen), Bernard Hart (London), E. H. Ackerknecht (Wisconsin and Zurich), Aubrey Lewis (London), G. W. Harris (London), H. McIlwain (London), Mary Brazier (Boston), Sir Francis Walshe (London), Chandler Brooks (New York).

EDITORIAL ANNOUNCEMENT

As of September 30, 1957, Mrs. Janet B. Koudelka has resigned her position as Assistant Editor of the Bulletin *to prepare herself for a career in medical library science. For many years Mrs. Koudelka has been associated with the* Bulletin, *which has greatly relied on her assistance, first in a secretarial capacity, then as of July 1, 1955, as Assistant Editor. The* Bulletin *gratefully acknowledges Mrs. Koudelka's devoted and outstanding services and wishes her well in her new field of studies and activities.*

OWSEI TEMKIN

BOOK REVIEWS

ROBERT J. BENFORD. *Doctors in the Sky. The Story of the Aero Medical Association.* Springfield, Ill.: Charles C Thomas, 1955. XV + 326 pp. Ill. $8.75.

This volume presents a detailed factual account of the growth of aviation medicine in the United States from the founding of the Aero Medical Association in 1929 to the present day. The presentation is entirely chronological, consisting of summaries of significant events and personalities of the first 25 years of the Association.

Several trends are evident in the text. The most prominent is the close affiliation of the Association with the air forces of the armed services. The vital interest taken by the Association in the progress of military aviation medicine from its inception is a great tribute to its founders and an enviable record of national service. In turn, the air forces have supplied devoted members and officers regularly since the organization of the Association. A central figure in these activities is Dr. Louis H. Bauer, chief founder of the Association, who commenced his professional career as a medical officer in the U. S. Army, served as first commandant of the School of Aviation Medicine and resigned from the service only to become medical director of the newly created Aeronautics Branch of the Bureau of Air Commerce in 1926.

With the growth of commercial aviation a close link has developed between medical men of both military and civil pursuits and this common bond may be largely attributed to the zeal of the Aero Medical Association. The united efforts of these professional people has resulted in the founding of the specialty of aviation medicine by the American Board of Preventive Medicine. An obvious goal of the Association is the recognition of aviation medicine as an independent specialty.

The wealth of chronologic detail provided by Colonel Benford should have wide appeal for all members of the Aero Medical Association whom the publication will serve as a veritable book of memories. Continued vigorous growth of aviation medicine has attracted widespread attention and the volume provides an excellent detailed account for all who wish to learn of its origins and ambitions.

ROBERT J. FAULCONER

GIOVANNI P. ARCIERI. *Agostino Bassi in the History of Medical Thought, A. Bassi and L. Pasteur.* Preface by Prof. Cesare Frugoni and an Inscription to the Reader by Prof. Andrea Corsini. Supplement to the *Rivista di Storia delle Scienze Mediche e Naturali,* 1956. XLVII. Firenze: Leo S. Olschki, 1956. 40 pp.

This short monograph is an appreciation by a devoted admirer of a vital if somewhat tragic figure in the control of infectious disease, Agostino Bassi of Lodi (1773-1856). The author's thesis is that medical history in the passage of time has

tended to minimize the pioneer and significant achievements of the discoverer of the cause of silk worm disease, in its emphasis on later outstanding figures who established bacteriology as an independent science in the second half of the 19th century. Dr. Arcieri has retraced the origins of modern understanding of infectious disease, in which Bassi played a memorable part, and brought renewed attention to the galaxy of investigators who overthrew the old belief in spontaneous generation.

ESMOND R. LONG

THE BULLETIN RECENTLY RECEIVED *

Bulletin et Mémoires de la Société Internationale d'Histoire de la Médecine. Vol. III, nos. 1-4. Bruxelles: Le Scalpel, 1956. 42 pp.

William Harvey. *Movement of the Heart and Blood in Animals.* Translated from the original Latin by Kenneth J. Franklin. Springfield, Ill.: Charles C. Thomas, 1957. xii + 209 pp. Ill. $3.50.

Pranjivan Manekchand Mehta. *Medical Anthology.* Chowk, Banaras: The Chowkhamba Vidya Bhawan, 1955. 74 pp. (Sanscrit and English).

Birgitta Moström. *Torbern Bergman, A Bibliography of His Works.* Stockholm: Almqvist & Wiksell, 1957. 120 pp. Ill.

The President's Review, from The Rockefeller Foundation Annual Report, 1956. New York: 49 West 49th Street. 85 pp. Ill.

K. E. Rothschuh. *Kleine Geschichte der medizinischen Fakultät der Universität Münster Westf.* Münster, Westf.: Verlag Aschendorff, 1957. 66 pp. Ill.

* The Bulletin reserves freedom of decision as to the publications to be listed in this section. Items received, other than those assigned for review, are ultimately incorporated into the collection of the Institute of the History of Medicine.

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